MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 7 DECEMBER, 1934 Number 7

CONTENTS

Published monthly by Gardner Publications, Inc., 704 Race St., Cincinnati, Ohio

DON G. GARDNER, President and General Manager

JOHN M. KRINGS, National Advertising Manager

IVER W. LEE, Pacific Coast Manager, Los Angeles

GEORGE H. MEYERS, Western Manager, Chicago

GRANVILLE M. FILLMORE, Eastern Manager, New York City

MODERN Machine Shop

CINCINNATI, OHIO — VOL. 7, NO. 7

DECEMBER, 1934

Polishing and Buffing are Important Operations

By WALDO HUTCHINSON

APPEARANCE is a highly important factor in the sale of many different kinds of articles, and that statement applies to metal products as well as to other kinds of merchandise. Even in the case of machines and tools, which are designed strictly for utilitarian purposes, after the mechanical efficiency has been considered the final decision to buy is influenced by the finish and general appearance of the article.

In spite of the fact that appearance is often a deciding factor in the sale of an article, the finishing operations are usually given too little consideration. Here is some useful information for polishers and buffers.

It will be generally conceded that the products with the most pleasing appearance find the readiest sale and command the highest price. In spite of this seemingly obvious fact, the polishing department in a manufacturing plant is all too often relegated to the least desirable corner of the plant, or to a separate building where the comfort of the workers and the maintenance of the equipment become minor considerations. Technical and scientific skill are utilized to the fullest extent throughout the manufacturing operations up to the point of polishing, and from there on the polishing room foreman and his men are left to their own devices with, as a rule, only their own experience to guide them.

Webster gives the definition of "polish" as "to make smooth or level." Thus polishing is the art of producing a smooth, uniform surface on metal by the use of an abrasive, usually glued to the surface of a wheel of greater or lesser flexibility. Polishing, as an individual operation, begins where grinding leaves off. Buffing is the art of imparting a lustre or color

An installation of United States Electrical Tool Co. polishing and buffing machines in a plant manufacturing vacuum cleaners

to the polished surface, and is accomplished by the use of an abrasive composition bonded with a wax or grease applied to the surface of a wheel which is built up of a series of cloth discs.

In polishing or buffing, the character of the material determines the character of the abrasive, and the condition of the original surface influences the size of the abrasive grain to be used. The contour of the work influences the selection of the type of wheel. Work with a plain surface calls for a hard, somewhat rigid wheel, while work that has a curved contour calls for a softer, flexible wheel that will fit itself to the surface that is to be polished. The degree of finish obtained is also influenced by the speed of the work past the polishing wheel; thus the slower the speed with which the work passes the polishing wheel, the better the finish will be.

Different metals require, of course, different methods of polishing. Thus in finishing steel or brass, a succession of sharp cutting edges must continually be presented to the work. The abrasive used, therefore, should be of a kind that will fracture in such manner and along such fracture planes as to form cutting edges that are always of the same character. An abrasive that fractures in such manner as to produce splinters and slivers will prove unsuitable as the splinters will cause scratches in the work, which will later have to be removed.

With soft cast iron, sharp cutting grains tend to dig iron particles out of the softer carbon matrix and to roll them along the work under the wheel. An abrasive that will crush instead of fracture is the one that will do the work in this instance. Turkish emery has been found satisfactory for working on aluminum, duralumin, and copper, while alundum is satisfactory on steel and brass. Crystolon does good work on cast iron.

The operation of polishing brass requires several times the horsepower that is required for steel. It has not been determined, as yet, what power is required to polish different materials under a given range of conditions. It is obvious, of course, that the size of motor that is satisfactory in a hand lathe is no criterion as to the

(Illustrations courtesy United States Electrical Tool Company, Cincinnati, Ohio)

size of motor that should be installed in a polishing machine.

It is readily apparent that a polishing wheel will work best on a clean, uniform surface, consequently the better the original surface, the lower will be the cost for equipment and labor for the polishing operation. Mill scale, which is hard and difficult for polishing wheels to break and which will often clog the wheel and render it ineffective, can often be softened by tumbling or pickling. The pickling must be carefully done, however, or it may make conditions worse.

As a general rule, polishing machines should be designed to maintain a constant peripheral speed of the polishing wheel as close as possible to 7,500 lineal feet per minute. This speed is about the maximum at which the glue which holds the abrasive to the surface of the wheel will maintain its strength under the action of the heat generated by the wheel on the work.

Of course, speeds that may be safe from the standpoint of wheel operation may be ruinous to the work if the heat generated has an adverse effect upon the metal of which the work-piece is composed. Therefore cutting speeds below 7,500 feet per minute may be necessary, although the cutting action of the abrasive will be decreased and a longer time required for removal of a given amount of metal.

In preparing surfaces to be buffed, a 14-inch diameter soft muslin wheel, headed with a suitable grit and running at 1,750 r.p.m., is the accepted type of wheel. To finish wide sheets of stainless steel or rustless iron, as many as seven or eight operations are required to obtain a relative mirror finish. On narrow strips ranging from one to six inches wide and for articles similar to radiator shells, the number of operations can be reduced considerably.

Small stamped, spun, or drawn articles of stainless steel having smooth surfaces are readily buffed by using a fine count buffing wheel operating at a peripheral speed of 10,000 to 15,000 feet per minute, cutting down the surface with a special composition made

Polishing parts for ranges and other hotel and restaurant kitchen equipment. Note the design of the machines in the foreground, the "overhang" of the machines being such that the operator can work close to the wheel.

for this purpose and coloring with chromium oxide.

It is customary in buffing these parts to mount both the cutting and coloring buffs on one spindle, thus enabling the operator to finish the part at one handling. Much has been said about the importance of the amount of pressure applied in polishing stainless steel. However, the amount of pressure to be applied can only be determined by experiment on a given stock and should be variable with different grades of grits and the cuts taken on the work in process.

The sequence of grits used on wide sheets of certain makes of stainless steels are Nos. 80, 120, 150, and 180. The sheets are then brushed with a tampico wheel with No. 200 emery cake applied locally, following with a buffing operation with any of the fast-cutting compositions made for this work and finally coloring with chromium oxide.

The cutlery trades use large quantities of stainless steel in the manufacture of tableware, and have a well-defined process of finishing. After being ground, the blades are passed between two polishing wheels of the compress type which, for this work, has a flexible cushion and covers the width of the blade. The wheels are mounted on a double-head polishing machine in such manner that both sides of the blade are polished at one draw. Usually two passes are necessary to complete the operation.

The latter operation is now being done on a so-called mirror-finishing machine in which the blade is passed lengthwise with a sweeping motion over a cotton buff wheel charged locally with composition. After all wheel marks have been removed, the blade is highly colored by hand on a coloring wheel. The reduction in the cost of stainless cutlery to a point that makes possible its universal use can be credited largely to the use of these machines.

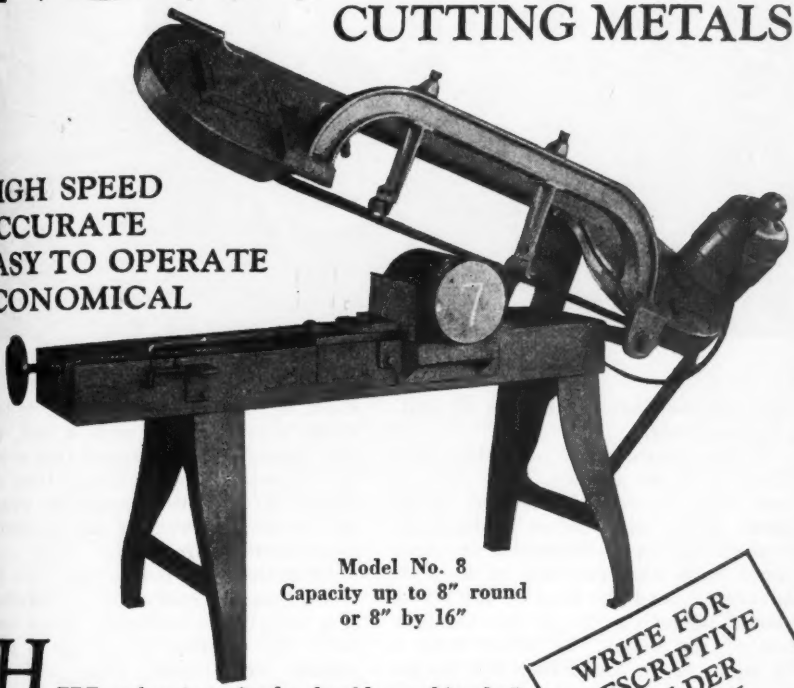
In a large machine tool plant in Cincinnati (American Tool Works), the polishing and buffing operations are performed in a department maintained for that purpose. The polishing machine used employs a steel disc 40 in. in diameter which is faced with an alloy of lead and tin. The speed of the disk is 400 r.p.m. The machine is used for topping flat surfaces on various parts such as guards, covers, doors, and so on. The abrasive medium used is No. 40 Turkish emery, which is rolled into the face of the lap with a taper roll. When not in use, the roller arbor rests on a bracket which holds the roller out of contact with the lap face. The inner end of the roller arbor runs in a journal at the center of the lap provided for this purpose. The operation of charging the lap takes but a short time and once the lap is charged properly, it can be used for several hours without recharging.

Another interesting operation involves the use of the polishing belt. The machine is fitted with a canvas belt, six inches wide and 14 feet long, set up with No. 40 abrasive. The belt runs over two pulleys, one of which is the driver and the other, the idler. The pulley at the under, or working, side of the belt is fitted with a hood connected to an exhaust system. To keep the belt under proper tension, the idler pulley is provided with a bracket working in a slide that can be adjusted by means of a screw and hand wheel so that the belt can be tightened or slacked off when belt adjustment is necessary.

This machine is used to polish cast iron surfaces such as the flat parts of lathe carriage tops, which are polished after planing. In the operation the work is carried on a sliding carriage that can be moved back and forth in a direction at right angles to the direction of belt travel. This method can be adapted for many parts

NOW! A BAND SAW *for* CUTTING METALS

HIGH SPEED
ACCURATE
EASY TO OPERATE
ECONOMICAL



Model No. 8
Capacity up to 8" round
or 8" by 16"

WRITE FOR DESCRIPTIVE FOLDER TODAY

HERE at last is a simple, durable machine built exclusively to meet the demand for a low cost, high speed metal cutter. The Wells Metal Cutting Band Saw will cut any metal thick or thin, sheet, rod or tubing, in any size up to its capacity. Scores of comparative tests have demonstrated its ability to save one-half, two-thirds, or even more of the time required by other cutting equipment. Because excessive friction is eliminated it can be run continuously at high speed without the use of any coolant, thereby increasing production without loss of time and with greater efficiency. In routine shop work it saves the time of men who must wait for the cut to be completed—in general work its ease of operation and adaptability are profitable advantages—in production work its high speed lowers cost per cut.

The many outstanding features of the Wells Band Saw are clearly shown in our new descriptive folder. Write for it today—learn more about this improvement in machine shop equipment.

THE WELLS MANUFACTURING CORP.

THREE RIVERS, MICHIGAN

Polishing radiator shells in a large automobile plant.

that are too heavy to handle by ordinary methods.

In the finishing of plumbing supplies, such as elbows, ells, crosses, tees, and so on, a polishing wheel about six to eight inches in diameter is used. A felt wheel headed up three times with abrasive can be used to advantage, and the face of the wheel should be such as to fit into the hollow of the bends. A wheel with a ⅛-in. to ¼-in. round face will be required, and the surface should be neither too hard nor too soft.

A medium felt wheel has a certain amount of "give" and should impart a smooth finish with one operation only. The face of the medium felt wheel should be of a width to accommodate the sizes of the articles in process, probably ½-in. to 1½-in.—and should be set up with No. 120 abrasive. If the work-pieces are of soft yellow or red brass, a one-wheel operation will be found to be sufficient.

However, time can be gained if two wheels are used. The second wheel should be set up with No. 150 abrasive and used with a grease face, a green stick, or tripoli and mutton tallow. When cutting down with a buff, the buff should be so arranged that it will not crowd in the hollows; thus the marks left by the polishing wheels can be removed readily and a smooth, clean surface produced.

After the work-pieces have been cut down, they are ready for color-buffing. It is not always necessary to use loose buffs for coloring to obtain a good lustre; worn buffs, clean and free from tripoli rouge can often be used. The use of a little ground chalk now and then will leave the work clean and free from grease and ready for plating, if plating is to follow.

In a plant manufacturing vacuum cleaners, a unit of 80 men is devoted to polishing and buffing, the department being located in a one-story building at the rear of the plant. The parts are largely die castings, and because of the soft structure of the metal, care must be taken to obtain a perfect mirror finish.

The work is not handled according to the line system of production in which each operator performs a single operation; instead, each workman car-

ries a batch of castings entirely through the process from roughing to tampico brushing. He then sends the castings to a buffer who completes the finishing. One buffer handles the work of two polishers.

The sequence of operation is similar for various castings, and the process used for the duplex bottom casting is typical of the general finishing operation. In polishing the bottom castings, each operator uses a set of 20 different sizes and styles of sewed, pieced, muslin polishing wheels, ranging in size from thin wheels of six inches diameter for the corners and narrow places to thick, heavy, 16-inch wheels for larger flat surfaces. The entire set of wheels is used in polishing a single bottom casting. American emery is used in all of these operations.

The first polishing operation is roughing in preparation for the finer polishing, No. 80 emery being used. The best results are obtained by greasing the work even in rough operations, contrary to the ordinary polishing practice on other materials. Every polishing operation in the sequence is a "greased" operation.

The next two operations are performed with wheels set up with No. 120 and No. 180 emery, respectively. The latter operation is carried out with felt wheels and leaves the castings with a bright, smooth finish, free from scratches or imperfections. In the fourth operation, the castings are polished on tampico brush wheels.

The first buffing operation is performed with sewed, unbleached muslin wheels, using tripoli in cake form, held with a grease binder. The buffing wheels are subjected to hard usage, however, and last only four operating days in normal service. After the first buffing, parts are washed in a bath of hot ammonia and soap to remove all dust and grease.

The final operation is the coloring, which is done with amorphous silica or white diamond compound. Soft, unsewed muslin wheels are used, running at least 3,000 r.p.m. and producing a high mirror finish seldom equalled in work of this character.

Shells for automobile radiators are polished, but in some cases automatic machinery cannot be used because of the curved surfaces. Consequently this work must be done by hand, as shown in one of the illustrations. All the polishing lathes shown in the illustration are electrically driven.

In the plant shown, the wheels are 14 in. in diameter with 2-in. face, and are operated at an approximate peripheral speed of 8,500 ft. per min. The first operation consists of cutting down on a stitched muslin wheel that is set up with No. 120 manufactured alumina. In this operation, the surface is leveled and slight imperfections are removed. Then the shells are passed over wheels of the same type and size, set up with No. 150 abrasive. This is an oiling process, and is followed with another oiling operation with No. 180 grain abrasive. The final operation is performed with sheepskin wheels set up with No. 200 grain abrasive. These are also piled wheels.

These operations are followed by cleaning to remove oil, after which comes an operation of copper plating. The shells are then buffed on loose muslin wheel 14 in. in diameter by 2 in. thick, to which rouge has been applied. This completed, the shells are nickel plated and are then buffed with white compound on wheels of the same type as those used previously, which completes the process. Buffing wheels for this work are operated at peripheral speeds of approximately 10,000 feet per minute.

It is evident from the foregoing that the finish obtained and the cost of the finishing operation vary according to the efficiency with which the job is handled.

Shrink-Fitting with Dry Ice

There are cases where the application of heat to an external member in order to obtain a shrink fit is impracticable. The authors describe such a job, and tell how the desired results were obtained by shrinking—in the internal member.

By A. W. Brown, Pure Carbonic, Inc., and E. V. David, Applied Engineering Department, Air Reduction Sales Company

SHRINK fits are common to metal construction, such fits usually being obtained by expanding the outer member through the application of heat and assembling the outer and inner parts before the outer one has time to cool. However, it is obvious that there must be cases where the application of heat for this purpose is impracticable, due to fire risk or to the possibility of warping or otherwise damaging the parts.

Such a job was that involved in the construction of four 95-ft. girders to be used in the building of a Bascule bridge over the Shrewsbury River. Four bearing hubs were to be shrunk in; one in each girder. As it was desired to avoid the fire risk and the possibility of warping and damage to the girder which might result from the application of heat, it was decided to shrink the internal member by the use of dry-ice.

A drawing of the Bascule bridge girder bearing hub, showing dimensions, is reproduced in Figure 1. As can be seen, the fit was to be made on the 45-in. diameter. Accordingly, the hub was machined 0.008 in. oversize on this diameter. It was esti-

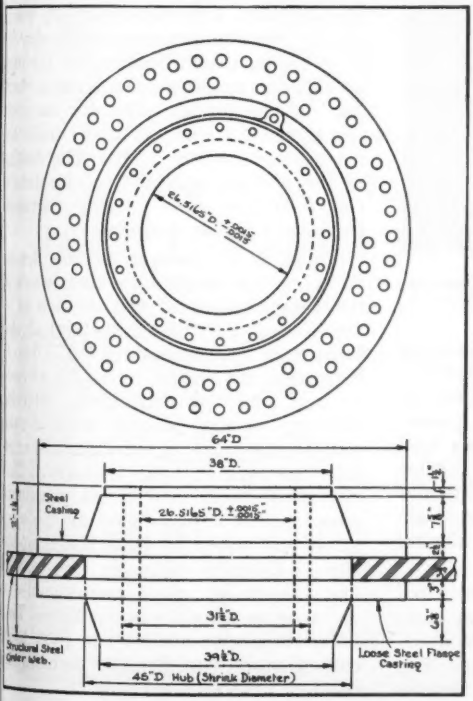


Fig. 1—Drawing of Bascule Bridge Girder Bearing Hub For Shrewsbury River Bridge.

mated that clearance of 0.010 in. would be needed to enable the hub to be lowered into the girder without jamming, hence a total shrinkage of 0.018 in. was required.

In order to shrink the hubs, it was necessary that a cylindrical container be constructed, of sufficient diameter and height so that a bearing hub could be placed in it for cooling. Accordingly, a steel shell with bottom plate and reinforcing ribs was made of arc welded construction as shown in Figure 2. A series of wooden filler pieces were fitted inside the container

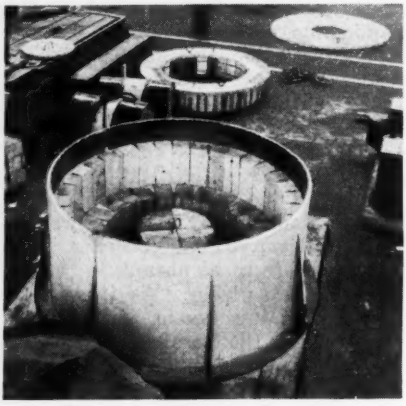


Fig. 2—Cooling Chamber for Submerging Bearing Hub in Dry-Ice and Alcohol.

to fill up the voids around the bearing hubs, as shown, and a wooden cylinder, a few inches less in diameter than the 26½-in. bore of the brass, was placed in the center to displace the large void in the center of the hub. All the filler blocks were anchored or wedged firmly in place to prevent loosening and floating to the surface when the alcohol was poured in.

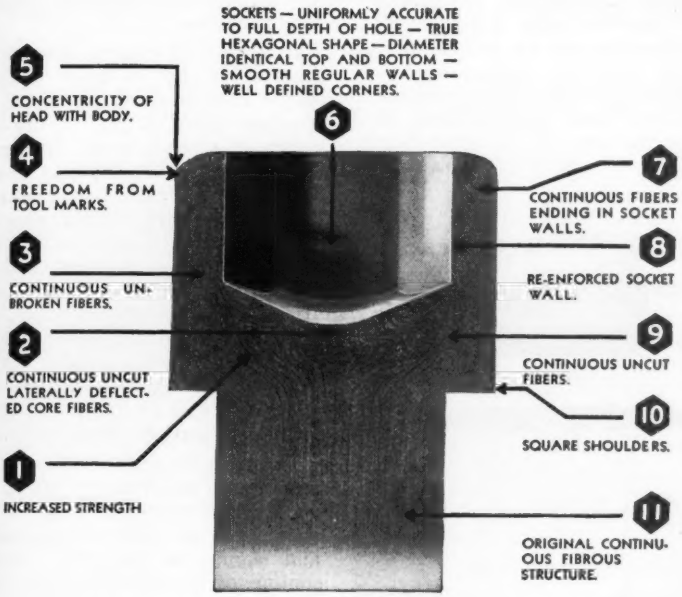
Inasmuch as insulation was required to keep out the heat from the surrounding atmosphere during the operation, the outer surface of the cooling chamber was covered with Johns-Mansville 85 per cent magnesia plastic cement, and a circular wooden lid was provided to cover the hub while cooling. It was necessary to use a crane to lift the hubs in and out of the container, as each cast steel hub weighed 6,390 lbs. and a bronze bushing fitted into it weighed 2,030 lbs., making a total of 8,420 lbs. Another reason for the use of handling equipment consisted in that the parts, when cooled to the low temperature desired, should not be touched with bare hands in any case.

The heat transfer medium consisted of industrial alcohol combined with dry-ice. The dry-ice was put into bags in which it was broken into pieces and then was dropped into the alcohol. Inasmuch as the pieces of dry-ice are of high specific gravity, in such operations they sink to the bottom of the alcohol bath. The comparatively warm alcohol rapidly evaporates the dry-ice to CO_2 gas, which bubbles up through the alcohol, causing considerable "boiling" of the liquid. The dry-ice cools the alcohol, which, in turn, cools the work-piece resting in it. The boiling of the alcohol causes it to circulate in the container and greatly increases the rate of heat transfer.

There is no danger of the dry-ice freezing the alcohol in such work as the temperature of the dry-ice is —109.35 deg. F. while industrial alcohol freezes at approximately —175 deg. F. However, no water must be allowed to get into the container. Stirring the dry-ice and alcohol with a stick will increase the circulation and expedite the rate of heat transfer. Thus the alcohol is cooled at maximum speed and is kept as cool as the operation will allow so that the temperature difference between the alcohol and the metal piece being cooled is as large as possible at all times. This, of course, also causes the part to be cooled more rapidly and reduces the cooling time still further.

FIBRO FORGED SCREWS

TRADE MARK



Patented by **Holo-Krome**

FIBRO FORGED SCREWS

mean "Unfailing Performance"

Free Samples gladly sent upon request. Write today.

The Holo-Krome Screw Corp.

BRISTOL, CONNECTICUT, U. S. A.

HOLO-KROME FIBRO FORGED TRADE MARK SCREWS

Considerable cooling of parts for freezing has been done by simply packing them in dry-ice without the use of alcohol. However, in sublimating, the dry-ice forms a film of CO_2 gas between the dry-ice and the metal surface of the work-piece, forming a non-conductor of heat. Accordingly, the rate of heat transfer from the piece to the dry-ice is exceedingly

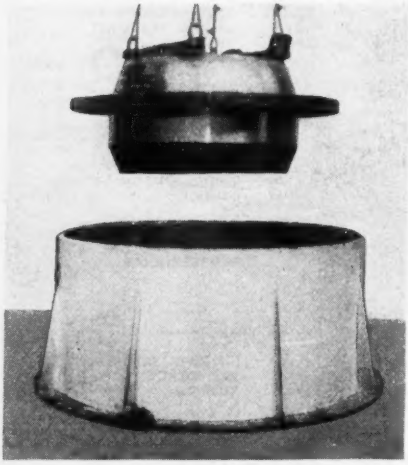


Fig. 3—Cooled Bearing Hub Being Hoisted Out of Cooling Chamber.

slow. Furthermore, it is very difficult to tell whether the part has been fully cooled or not or whether it is cooled evenly or only in spots.

Where alcohol is used, however, it is easy to tell when the piece is completely cooled as the rate of heat transfer from the work-piece to the alcohol becomes slower as the temperature of the dry-ice is approached. As this condition is reached, the dry-ice gasifies more slowly and the boiling of the alcohol is accordingly greatly reduced. And as the part is immersed in the alcohol, there is no question about its being cooled evenly and thoroughly. If a thermometer can be installed in the side of the container to show the temperature of the alcohol during the cooling process it affords a check on the progress of the operation.

It is true, of course, that where industrial alcohol is used in the container it also must be cooled. This requires about 3 lbs. of dry-ice per gallon of alcohol used. But, particularly where several pieces are to be cooled in succession, the extra consumption of dry-ice for cooling the alcohol is more than offset by the greatly increased speed of cooling with alcohol and the certainty of the operation. As a matter of fact, due to the greatly reduced cooling time and the correspondingly smaller cold losses in the container, the total consumption of dry-ice will probably be less when alcohol is used, in most cases.

In order to reduce the alcohol requirements and the amount of dry-ice necessary, obviously the container should be no larger than necessary and should be shaped to follow the contour of the piece wherever possible. Only enough alcohol to cover the part should be poured in.

In using this method it is recommended that the internal part be inserted into the external part immediately after being removed from the cooling container and measuring the shrinkage. An additional advantage of the alcohol method is that the part when removed from the liquid, is covered with a thin film of alcohol. This film prevents formation of frost which might make it difficult to insert the piece into the hole. Furthermore, the alcohol has a lubricating effect on the wetted surface which assists in the insertion of the piece. Where delays occur, the piece should be returned to the container and cooled again before attempting to make the fit, thus precluding the possibility of failure and perhaps of spoiling expensive parts.

After lowering the first bearing into its cooling chamber and installing the wooden filler ring and cover in place over it, 120 gallons of industrial alcohol were poured in, just covering the top of the bronze bushing. The small pieces of dry-ice were then shaken out of the bags into the alcohol. Some 1200 lbs. of dry-ice were required for the job. Then the small lid was put in place and the container with the hub in it was allowed to stand, except for occasional stirring. The right cooling time for each piece was about 2½ hours.

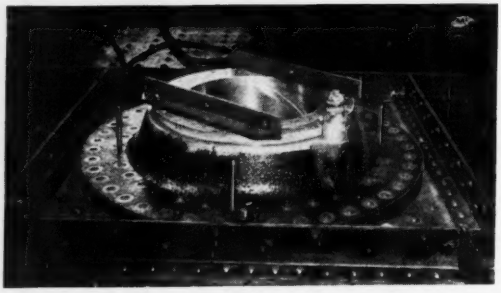


Fig. 4—Bearing Hub in Place in Girder.

At the end of this period the cover and filler ring were removed and the slings were made fast to the hub, which was then hoisted out of the chamber, moved over the hole in the girder, and lowered into it. It dropped in quite easily, as might have been expected. Figure 3 shows the bearing hub in place in the girder. It will be noted that drifts were used in the last stages of lowering to align the holes in the hub with those in the girder. The temperature of the alcohol in the cooling chamber at the time the bearing hub was taken out was found to be —48 deg. C. or —54.4 F.

It is evident from the above that the dry-ice and industrial alcohol method is a very satisfactory and economical one, particularly for making fits with large heavy parts of perhaps 10 in. or more in diameter. It is not recommended that this method be used in the assembling of light parts of, say, 2½ in. or less shrink diameter as such parts can best be expand-fitted by the use of liquid air. The two methods of making shrink fits with cold are not, as might at first be surmised, in direct competition with each other. On the contrary, the one process supplements the other, each being suitable for applications for which the other is either inadequate or uneconomical.

(Data courtesy Air Reduction Sales Company. Illustrations courtesy American Bridge Company and Federal Shipbuilding & Drydock Co.)

BOROLON POLISHING GRAIN. The Abrasive Company Division of Simonds Saw and Steel Co., Philadelphia, Pa., has issued a folder describing the advantages of "Borolon" Polishing Grain. Borolon grains are used on all types and kinds of polishing operation from coarse roughing to fine finishing, different grain sizes being used for the different classes of work. Other uses include tumbling, sandblasting, lapping, coating abrasive belts, cloth, paper, and discs.

The folder gives instruction for setting up wheels to obtain the best results and gives a table of Borolon grain sizes. Copies free upon request.

A BULLETIN intended to simplify the task of selecting flexible metallic hose has been put out by Seamlex Corporation, 19 48th Ave., Long Island City, N. Y. The bulletin lists in order and illustrates the eight principal engineering characteristics of the flexible metallic hose made by this firm for conveying steam, gases, liquids, powered materials, either for vacuum or high pressures. Copies gratis upon request.

The Foreman's Duties and Responsibilities in Preventing Accidents

By GLENN GARDINER

(Delivered at the Annual National Safety Congress of The National Safety Council, Cleveland, October 3, 1934)

MY first job was that of "pit man" in the clay pit of a brick works. Soon after I went onto that job I witnessed a cave-in in the clay pit which buried one of my fellow workers and rendered him almost totally disabled for life. That was years ago. On a recent visit back home I saw that same man being pushed around town in a wheel-chair —a completely dependent charge upon members of his family.

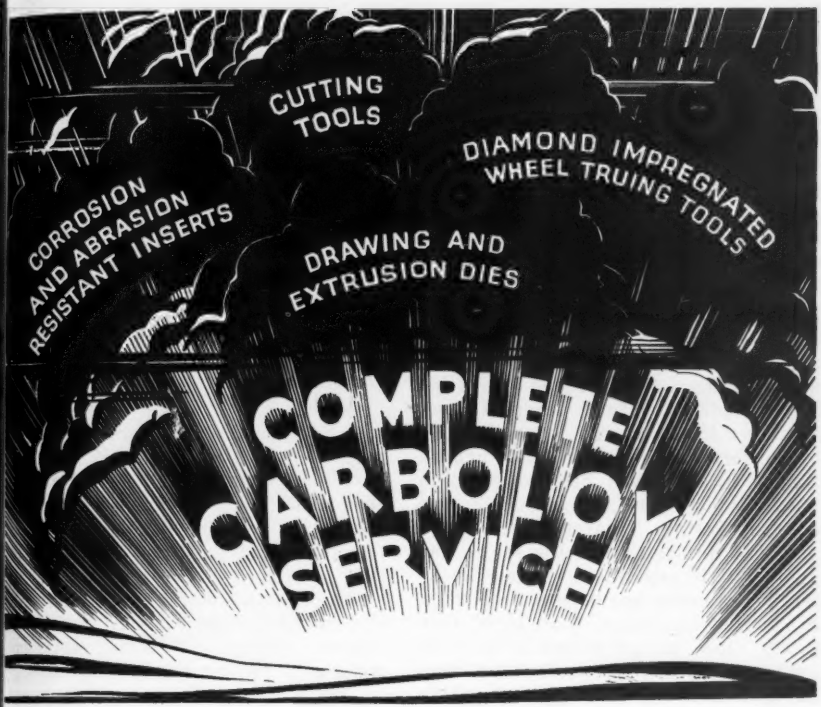
It was recognized at the time of that accident that it had been caused by a condition of the pit which the pit foreman, had he been conscientious and careful about the safety of his men, would never have permitted to exist. It was so evidently a case of sheer negligence on his part that he was discharged after the accident had happened. But firing that foreman could never restore the unfortunate victim to normal physical condition.

That was my first vivid lesson in a foreman's responsibility for accident prevention. It was then that I became deeply impressed by the responsibility which rests upon every foreman or executive who supervises men working under conditions in which any accident hazard is present. Who else but the foreman is in a strategic position to know the danger points, to know the dangerous working habits of his men and to correct the conditions which must inevitably lead to injury and disability, if not death.

The foreman who is responsible for getting out the work is also responsible for the control of the conditions immediately surrounding the worker on his job. The average foreman probably spends more time with his workers than members of the worker's own family. He has an unexcelled opportunity to get to know the workers and his habits. By close observation and study of his men he can, if he is a competent foreman, detect those working habits which may result in accidents.

The foreman should come to know his workers well enough to know when home worries and outside-the-job problems are taxing his mind and his powers of concentration. He may not always be in a position to do much about the outside problems but he can, at least, be governed in his handling of the worker's activities on the job by his knowledge that the worker's mind is probably divided between his personal problems and the manipulations of his job.

The foreman is the one who is most likely to set up conditions on the job which cause job anxieties for the worker. He can do much to ease the worker's mind by keeping him informed about conditions which affect his job and its continuation. The fore-



Carboloy Cemented Carbide Offers Savings in Four Distinct Fields of Use

There are four established fields of use for Carboloy cemented carbide—each offering opportunities for substantial savings to manufacturers fabricating ferrous, non-ferrous or non-metallic materials. The following brief summary may suggest opportunities for further savings in your plant. In each case the ability of Carboloy to effect economies is thoroughly established.

1. *Carboloy Cutting Tools:* Used on practically all types of machining operations, including turning, boring, facing, reaming, milling, forming, grooving, etc., on all metals and non-metallic materials.
2. *Carboloy Drawing and Extrusion Dies:* Extensively applied on all types of wire, bar, tubing and shaped work.
3. *Carboloy Truing Tools:* A special diamond-impregnated Carboloy used in place of the single diamond for truing all types of grinding wheels.
4. *Carboloy Wear Resistant Inserts:* Used on all tools and parts subject to rapid abrasive or corrosive wear. Just a small insert of Carboloy brazed in at the point of wear increases the life of the part from 10 to 25 times.

Complete information on the application of Carboloy in any one or all of these fields of use will be gladly supplied without obligation.

CARBOLOY COMPANY, INC.

2975 E. JEFFERSON AVE., DETROIT, MICHIGAN

CHICAGO CLEVELAND PHILADELPHIA NEWARK PITTSBURGH

Canada: Canadian General Electric Co., Ltd., Toronto

man can help to reduce the fatigue his men experience and in so doing may directly influence accidents — which we all know are related to fatigue.

The foreman himself may be a thorn in the side of his workers. Supervisory irritations frequently put workers in a sullen or ugly mood and such a mood is not conducive to safety.

Every intelligent foreman realizes the importance of the safety functions. He realizes that safety should and must be put upon the same plane of importance as the other duties his job includes. Safety deserves such consideration because it is worth while to conserve human life and health. Safety is important because hand in hand with safety go efficiency and efficient results. Safety deserves a place of importance because of the good will it engenders among workers. There never has been a time when it is more important than right now to do those things which help build up harmonious relationships between workers and the management which the foreman represents.

The indifference of some workers to the matter of safety is usually but a reflection of the foreman's attitude. The worker is likely to be just about as much concerned about safety as his foreman is. If he knows that the foreman will stand for nothing but safe working habits, he will proceed very rapidly to develop safe working habits.

It is natural for a man to be concerned about his own safety. An attitude of indifference toward personal safety is rather strong evidence that something is wrong with the manner in which the foreman is handling the whole safety situation. When we realize what a serious matter an accident causing permanent disability can be in the life of a worker, it is hard to believe that any worker will be deliberately indifferent to his own safety. Of course, I recognize that certain workers have an attitude of recklessness and bravado about them which makes them slightly contemptuous of the dangers of the job. It is up to the foreman, however, to puncture this attitude and bring such workers down to earth.

When we realize that a disabling accident which cuts a worker's earning power in two may put a blight upon his whole life and the life of his dependents, it is easy to see that the foreman has all the advantage on his side in overcoming the worker's indifference.

A recent study of a company employing 6,600 workers indicated that 48 out of the 6,600 had had 10 per cent of all the lost time accidents for the entire organization. The accident frequency among these 48 men was fifty times as great as that of the average for all workers. The records also indicated that the men having the largest number of minor accidents were also having the largest number of lost time accidents. Thus minor accidents are of real significance to the observing foreman because they point out to him the men who will most probably have the lost time accidents.

It is also a matter of great importance that minor injuries receive proper first aid attention. Why are so many men careless or reluctant to properly report small injuries? Here are some of the causes for this attitude:

1. Fear of the record — especially fear of being considered careless if the record shows repeated injuries.

2. Feeling that the injury is too trivial, especially since such injuries have always healed satisfactorily in the past.

3. Lack of appreciation of the importance of reporting and getting proper medical treatment.

4. Fear of ridicule by fellow employees.

5. Inconvenience of going to the first aid department.

6. The dislike of the employee to lose time, especially when such loss of time will affect his earnings or the earnings of the others in his group.

7. The possibility of obtaining unauthorized medical attention without absenting himself from his work.

If we will give consideration to these clauses for failure to report small injuries, we will discover in the causes the answer to the solution. Foremen should get across to their workers the idea that adhering to safety rules and standards is just as important a part of the working methods on their job as the production of quality work or the proper quantity of work. The workers should be made to understand that reporting and getting authorized treatment for minor injuries is a credit to them, while failure to do so is not only a violation of rules but a discredit to the men themselves. They should understand that safe men are preferred and that the employee who reports minor injuries is considered safer than the man who neglects them.

Foremen have the duty and the responsibility for enforcing **safety** standards. They must enforce safety. Failure to do so increases the number of accidents in the first place. Secondly, the same laxity that increases accidents lowers efficiency. We can almost judge the general efficiency of a foreman's department by an examination of his safety record. Safety and efficiency do go hand in hand. The same kind of capable supervision that leads men to observe safety standards also leads men to observe quality and production standards. In educating men to safe habits of work, they are also being educated in habits of carefulness which carry over into the quality side of their operations.

Many supervisors make the mistake of assuming that "safety is a lot of hooey." Such foremen fail to realize that in training workers to work safely they are also training them to work efficiently. The capable, efficient worker is not a clumsy, awkward worker. The worker who has the best coordination of his mind and muscles is the safest worker and he is also the most efficient worker. Therefore, safety should be promoted among the workers if for no other reason than to increase their efficiency.

Here are some points at which every foreman should check his own methods of enforcing safety standards. Let each foreman ask himself these questions:

1. Are safety standards clearly and completely understood by each and every one of my workers?

2. Do I give careful safety instructions to every man I hire and to every man whom I put on a new job?

3. Do I conscientiously try to assign the least hazardous jobs to those workers in my force who are most prone to accidents?

4. Have I ever attempted to "sell" safety standards to my workers by arousing their pride on the basis that the safest worker is also the most efficient one?

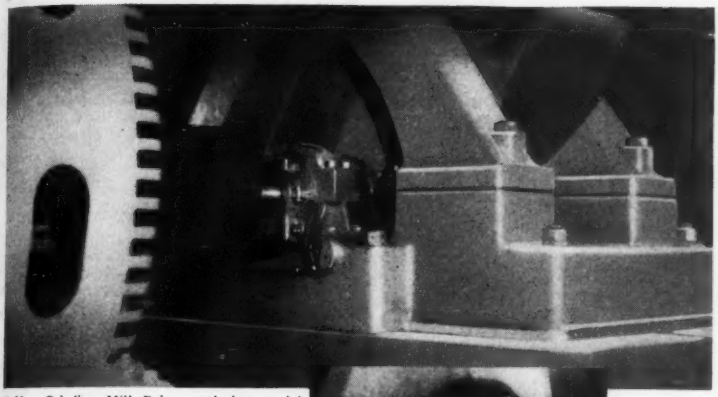
5. Do I rigidly enforce the regulations that each worker should report every accident no matter how slight?

In the last analysis management itself is responsible for the attitude of its foreman on the safety question. Just as the indifference of the worker can be traced to the indifference of the foreman, so can the indifference of the foreman most often be traced to a certain indifference on the part of top management with reference to important safety and accident prevention functions.

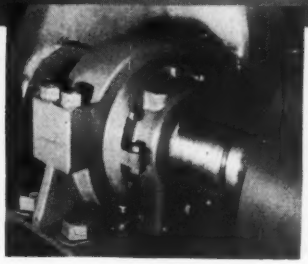
It has been my observation that management has let down on its

(Continued on page 38)

Friction Fighting BRUTES



Rubber Grinding Mill Drive employing special double cage assembly, 6 7/16" bore Fafnir Roller Bearing Pillow Block



For the Tough Jobs

700 H.P. at 600 r.p.m. is the job assigned to these Fafnir Roller Bearing Pillow Blocks in a rubber grinding mill. It's typical of the installations which are occurring with increasing frequency—applications where the power savings which anti-friction bearings can deliver mount into large figures—where dependability is vital—where compact design is all-important. Fafnir Heavy Duty Industrial Roller Bearings are the economical answer.

In the illustrated application 40% to 50% was saved in power consumption, much more in lubrication costs, and Fafnir Roller Bearings practically eliminated the ever-present bearing breakdown problem despite the severe over-loads which frequently occur.

Fafnir offers a comprehensive line of heavy duty industrial roller bearings. Write for complete information. THE FAFNIR BEARING COMPANY, *New Britain, Conn.* Atlanta . . . Chicago . . . Cleveland . . . Dallas . . . Detroit . . . Milwaukee . . . Minneapolis . . . New York . . . Philadelphia.

News of the anti-friction bearing progress is the basis of every issue of "The Dragon." Let us add your name to the mailing list.

FAFNIR BALL BEARINGS

Punch Press Operations and Tools, III

In this article the author takes up the design of piercing and blanking dies, and shows how the scrap can be held to the minimum.

By C. L. Szalanczy

IN addition to the tools discussed in previous articles of this series, the piercing and blanking die is also a punch press tool of the progressive type. In the production of a sheet metal part in which holes are made by the press tools, the piercing operation is performed first and the blanking operation completes the blank by cutting it out to the required size and shape.

When a progressive die of this type is used, the blanks are cut from strip material which may be either standard rolling mill stock "strap", or strips sheared to the required width from sheet material. In most shops where any amount of press work is done, the raw material is delivered in sheets ranging from 28 to 60 inches in width by 96 to 120 inches in length. For hand feeding, these sheets are usually cut in half, lengthwise, and are then sheared to the dimension best adaptable for the job in hand. The dimensions of the material strips are determined primarily by the shape of the blank to be produced, taking into consideration, of course, the amount of scrap allowed for each side of the blank.

Fig. 1—Drawing showing arrangement of punches. Punches are shown in section.

When a blanking die is being designed, the possible saving on raw material should be carefully considered by the tool designer. The scrap, or unused part of the material strip, has little value because usually none of it, or at most, but a small portion of it, can be used in the production of other blanks. Careful studies have been made, in the past, on the scrap ration both between the consecutive blanks and along both sides of the strip, and there are several tables of data in existence pertaining to this subject. The data is usually available upon request to the punch press manufacturers. With such data available in addition to the scrap allowances that are usually in effect in any stamping plant, it is not necessary to go into detail on the subject here.

It is obvious that there can be no definite rule to follow in the arrangement of the blanks in the strip; this factor depends entirely upon the different shapes of the blanks. The designer must therefore make a layout, arranging the blanks in such manner that the die will produce the greatest number of punchings per strip. By planning carefully in this manner the chance of mis-cuts may be eliminated

and the scrap or waste material held to the minimum, which in turn reduces the cost piece of the blank.

The layout will also show whether it would be more economical to make a double die as shown in Fig. 2, to

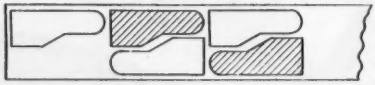


Fig. 2—Drawing showing arrangement of punches to produce two pieces at each stroke of the press, the die being laid out to minimize the scrap produced. Punches are shown in section.

produce two pieces at one stroke of the press, or to process the material by the "turn-over" method in which one side of the strip is blanked with the blanks so spaced that the strip can be turned over and another set of blanks punched from the scrap resulting from the first blanking operation. If the latter method is followed, the blanks produced in the second operation are punched from the stock left between the holes made in

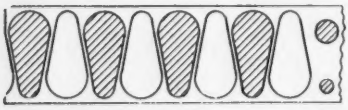


Fig. 3—Drawing illustrating method of reversing material for second cut, thus minimizing the amount of scrap produced. The second cut is indicated by the sections.

the first operation, as shown in Fig 3.

When punching out round blanks, the blanks should be staggered as shown in Fig. 4, so as to utilize all the material possible. The limit to which this rule can be made to apply depends, of course, upon the size of the blanks and the type and size of punch press used for the operation.

It often happens that the blanks are of such a shape that it is most convenient and economical to cut the blanks on an angle, as illustrated in Fig. 5. A study of the design of the blank will show that, by designing the die so that the extended portion of the blank is in close proximity to the body of the succeeding or preceding blank, the amount of scrap can be reduced to the minimum.

In many cases it is good practice to arrange the blanks in this manner when a bending operation that bends the material both with the grain and across it follows the blanking operation. This is done in order to obtain the advantage of the grain direction in the stock material. The matter of "grain" will be explained in detail

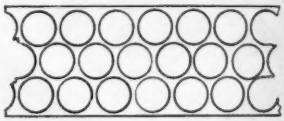


Fig. 4—Method staggering round blanks so as to save on material.

later when the subject of bending dies is taken up for discussion.

For purposes of discussion, a drawing of a blank is shown in Fig. 6. The blank is a clip, made of 0.063-inch half-hard sheet brass, with a ¼-inch hole pierced in it as shown. Figure 7 is an assembly drawing of the piercing and blanking die used to produce the blank indicated.

The part indicated at A, Fig. 7, is the die set with bushings and guide pins complete. The die is shown at B. The die is made of high grade tool

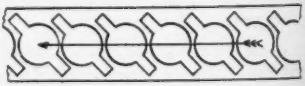


Fig. 5—Dies should be arranged so that projecting parts of blanks will be as close as possible to the preceding or succeeding blanks, or both, thus reducing the material cost and minimizing waste. The grain direction in the material is indicated by the arrow.

steel, which is first shaped nearly to size and then filed to the exact dimensions required to produce the blank. As can be seen by reference to the

drawing, the die is filed straight; that is, at exactly right angles to the surface for a depth of ⅛ inch, and is tapered the rest of the distance to the bottom. This is done to provide clearance so that the blanks will clear the die easily.

It has been found that usually in cases where the die was machined straight through, more pressure was required to push the blanks through the die than it took to punch the blank out of the material. A safe

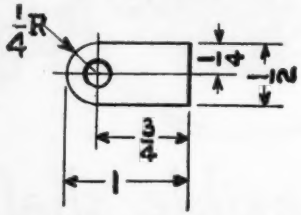


Fig. 6—Drawing of blanks for which the die shown in Fig. 7 is designed.

rule to follow is this; file a ¼-degree taper for clearance on a side for all materials of up to 0.046 inch thickness and ½ degree for materials of from 0.046 inch up to and including 0.155 inch. From 0.155 inch up the taper should be increased in proportion.

If the holes in the blank are to be punched to a given size, the standard formula for punchings must be kept in mind. The hole in the blank is finished to the dimensions of the blank and then the punch is laid out for size and shape by marking on the bottom of the punch through the hole in the die. After the punch has been marked off, the necessary clearance for the punch is provided by enlarging the hole in the die in accordance with the figures shown in the clearance table given in the first article of this series, page 24 of the October number of MODERN MACHINE SHOP.

If the object of the die is to produce blanks of a given size, the die is made to size and clearance is provided by reducing the size of the punch in accordance with the table referred to above. The die is usually hardened to 80 to 90 Scleroscope. In some cases, however, the blank is of such a nature and contour that better results can be obtained by hardening the die to a point somewhat under that indicated above, but which will give the metal a tougher texture and thus reduce the possibility of breakage. In such cases the die is hardened to from 68 to 73 Scleroscope.

After hardening, the die is ground flat on both top and bottom. The outer sides may be left rough machined unless it is desirable to machine them for sake of appearance. The die is then placed in position in the lower shoe of the die set, where it is held in place with four ⅜-inch diameter fillister head screws. Clearance holes are provided in the shoe so that both the scrap from the hole and the completed blanks may fall through to receptacles below. The clearance holes are made a little larger than the bottom of the tapered holes in the die.

The piercing punch C is made of high speed steel and should be made about ⅛ inch longer than the blanking punch D. The piercing punch should be shouldered, or made larger toward the upper end, for greater strength and greater backing surface. The punch is hardened, but the upper or shouldered end is left soft for the reasons explained in the previous article of this series.

The blanking punch D is made straight, so that it can be machined, hardened, and then ground to exact size. The upper end of this punch is also left soft, so that it may be peened over by center-punching on the line of the punch and the stripper. The punch is drilled and reamed through its entire length for the pilot P, which helps to locate the blank properly before the punch strikes it.

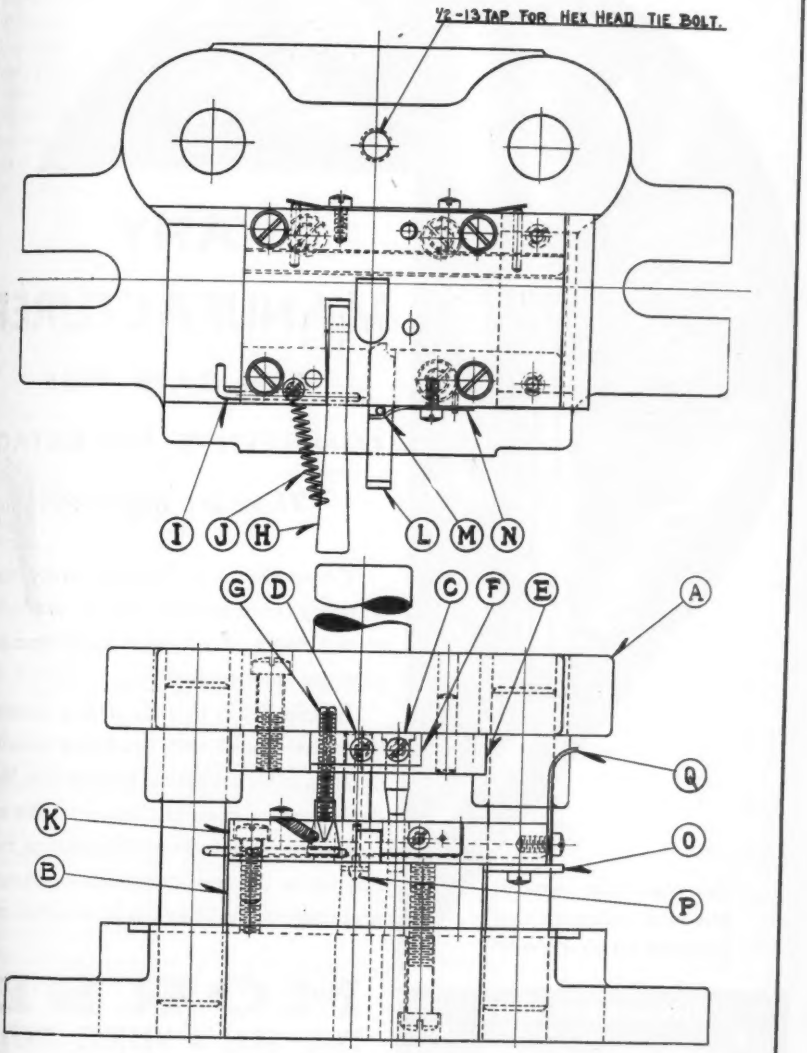


Fig. 7—Drawing of piercing and blanking die for producing the part shown in Fig. 6.

The pilot is made of tool steel and is hardened and ground to a point, as shown. The part back of the end is undercut to a smaller diameter and the smaller end is press fitted into the punch. The pilot must be removed from the punch each time the punch is ground, and then replaced before the die is used again. To extract the pilot, the punch is removed from the punch plate.

The punch plate **E** is of ⅝-inch

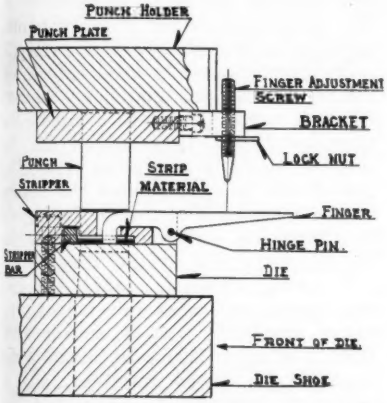


Fig. 8—Showing section through the die to illustrate the finger assembly.

cold rolled steel. If possible, the plate should be cut from standard rolling mill stock to reduce the machining of the four sides. The sawed ends need not be machined. The punches are held in the punch plate, which is fastened to the upper shoe with fillister head screws and two 5/16-inch dowels to prevent movement.

The special bracket **F** which holds the finger screw **G** is anchored to the front of the punch plate by means of two ¼-inch fillister head screws. The finger screw **G** is adjusted to suit the finger **H**, which works in a special slot in the stripper. The finger hinges on the pin **I**, and is supposed to snap back into position by the action of the expansion spring **J**. The spring is 9/32 inch in diameter and is made of 0.040-inch wire, fastened at the one end to the top of the stripper by a fillister head screw and at the opposite end by hooking the end of the spring through a hole in the finger. The necessary amount of tension must be obtained to operate the finger successfully. Figure 8 illustrates the finger and bracket assembly from the side.

The stripper **K**, Fig. 7, which is made of ⅝-inch thick cold rolled steel, contains the material channel through which the blank material is moved into cutting position. The stripper bar is of tool steel or cold rolled steel, case hardened. The stripper is also case hardened to resist wear in the material channel. A groove ⅝ inch wide by ⅛ inch deep is machined in place in the stripper to allow the starting stop **L** to slide in past the material groove. This stop is made of cold rolled steel, ⅛ inch thick by ⅜ inch wide, and has a ⅛-inch diameter pin, indicated on the drawing as **M**, pressed into it.

The flat spring **N** is fastened to the side of the stripper with one ¼-inch, 20-thread fillister head screw, and is held in alignment by a small pin. The spring is bent to shape so as to allow the pressure to bear on the pin **M**, thus keeping the starting stop in the material channel. In action, the operator feeds the material into the stripper until it touches the starting stop, then the press is operated and the piercing of the hole is accomplished. The operator now pulls the starting stop out and pushes the strip of material past the stop until it is stopped by the finger **H**. When the punch comes down with the next stroke, the blank is completed and the hole is pierced for the next blank.

The starting stop will bear against the side of the material strip until the end of the strip is past it, then it will automatically position itself

again for starting the following strip. The finger groove is machined out so that it tapers slightly toward the back, allowing the finger to rise and locate itself over the material, snapping back against the straight edge of the slot so as to bring the finger into correct position for spacing the succeeding blank.

The finger works in the opening made by the removal of the blank from the raw material strip. The stripper is usually longer than the die and has the apron O fastened to it. The sheet steel finger guard G is also attached to the stripper for safety.

Another commonly-used safety appliance is the hexagon head tie bolt which is used to hold the complete die together at all times when the die is not actually in use in the press. The use of this bolt eliminates the chance of the lower part of the die falling off and injuring anyone who may be handling the die at the time.

In most stamping plants, the dies are stored on racks or shelves, one above the other. It is readily seen that it is much easier to handle a die when it is bolted together, and it makes it practically impossible for the punch and die to become separated and one of the parts lost. This practice also reduces the amount of grinding and replacing of punches, especially the smaller ones which are so often broken either in transit or in storage.

(Editor's Note: Finger assemblies such as those illustrated in Fig. 8, adaptable for practically all dies and easily applied, can now be purchased at a nominal cost.)

Foreman's Responsibilities in Preventing Accidents

(Continued from Page 28)

emphasis on accident prevention during the recent depression years. Likewise the whole campaign in industry against accidents appears to have lost some of its vitality. Other anxieties have captured the attention of many of us. It has been more

difficult to sustain interest in effective accident prevention work.

Management is faced today with a tendency toward increased accidents. This rising tide of accidents must be checked. It cannot be checked unless the will to do so emanates from the top of the organization and is relayed down in no uncertain terms to the supervisory force. When the foreman knows that the management means business on this safety question he will begin to assume a corresponding attitude toward accidents among his own men.

A NEW TOOL BOOKLET of 8 pages, describing and illustrating new B & S micrometers, gages, arbors, measuring tools, arbors, and pumps, is now being distributed by Brown & Sharpe Mfg. Co., Providence, R. I. Copies gratis.

PERMITE BRONZE BARS. A six-page folder, issued by Aluminum Industries, Inc., 2440 Beekman St., Cincinnati, Ohio, gives details concerning the uses and advantages of Permite Leaded Phosphor Bronze Bars. Permite is bearing bronze in bar form, intended for use in screw machines and similar machine tools, to make possible higher production on bearings, bushings, and fittings. Copies of the folder are available without charge to mechanical executives.

PHILADELPHIA GEARS. This 48-page catalog, issued by Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Pa., describes, illustrates, and gives tables of specifications for each of the various types and kinds of gears made by this company. In addition to the spur, worm, internal, bevel, miter, intermittent, spiral, helica, continuous tooth herringbone, spiral bevel, and hypoid gears of metals of different kinds, the text includes data concerning Fabroil, Textolite and rawhide pinions, speed reducer units of all types and ratios, electric hoists, silent and roller chains, sprockets, flexible couplings, racks, universal joints, ratchets and pawls.

The book is profusely illustrated with photographs, drawings, and blueprints. Copies will be sent gratis to plant executives.

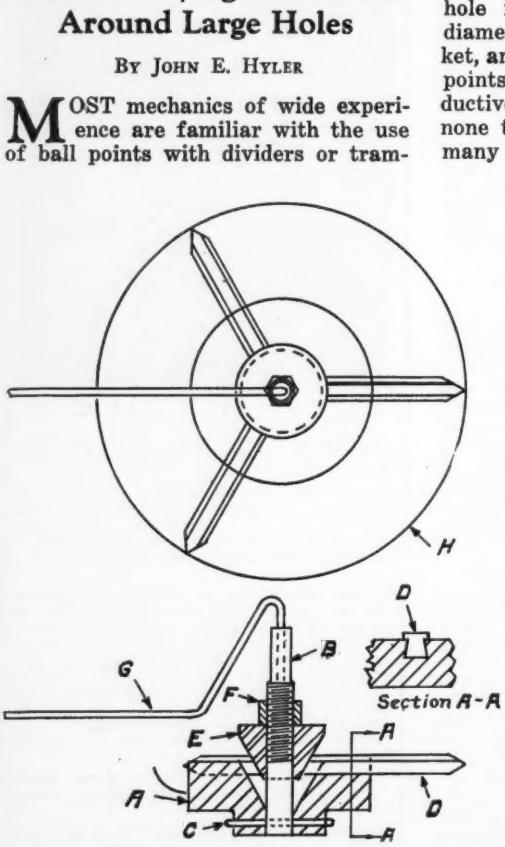
IDEAS FROM READERS

This department is a clearing house for ideas . . . If there is a "kink" or short cut in use in your shop, send in a description of it . . . Each one published will be paid for.

Tool for Laying Out Circles Around Large Holes

By John E. Hyler

MOST mechanics of wide experience are familiar with the use of ball points with dividers or trammels for striking circles or arcs from the center of a work-piece when the center has been cored, drilled, or bored. Ball points for use with dividers or trammels when the center hole is as large as 1½ inches in diameter may be obtained in the market, and larger ones can be made. Such points, even though they are not productive of absolute accuracy, will none the less be found convenient in many cases.



Tool for Striking Circles Around Large Holes

The tool shown here was designed to make it possible to strike circles from larger holes in the work. Once the tool is made, longer or shorter arms may be applied to the tool to make it adaptable to a wide scope of work. The accuracy of the tool will depend upon the accuracy with which the arms are made, and the maintenance of the accuracy will depend largely upon the equivalent sharpness and hardness of the points.

The construction of the tool is as follows: a circular hub A is turned to the form shown, bored for a force fit on the shaft B, and affixed thereto by means of the taper pin C, as shown. Into the face of the hub are milled three dovetails, 120 degrees apart, to receive the dove-tailed arms D as indicated in the section AA.

The outer end of each arm is pointed while the inner end is beveled off to match the bevel on the cone washer E. When the nut F is tightened, the cone E is forced down against the inner ends of the arms, spreading the arms

until the points engage the wall of the hole with enough force to hold the device in position.

The upper end of the shaft **B** is drilled and reamed to receive the end of a rod **G**. The rod should be a sliding fit in the reamed hole, and should be of sufficient size to support a trammel point. In making a tool of this type to be used chiefly for long radii and heavy work, it will undoubtedly be better to make the rod **G** of heavier material and reverse the manner of its application to the shaft **B**. That is; instead of drilling the shaft **B** to receive the end of the rod, the upper end of the shaft may be turned to form a heavy stud or bearing, and the rod **G** may be set into a sleeve that has been bored to fit the stud.

Non-Repeat Safety Latch and Trip Device

By Chas. H. Willey

THE drawing herewith illustrates the design of a safety device that I developed and applied to our power stamping presses. The devices have

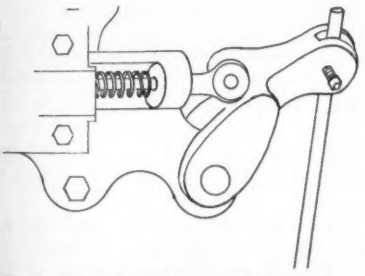


Fig. 1—Original design of tripping device.

been in use long enough to have been thoroughly tested, and has proved a godsend to us in the saving of fingers and press tools. Formerly a great many press tools were broken due to lack of care and alertness on the part of the operators. If the operator fails to remove his foot quickly enough after depressing the foot pedal, the press will "repeat"—often with disastrous results either to the operator's

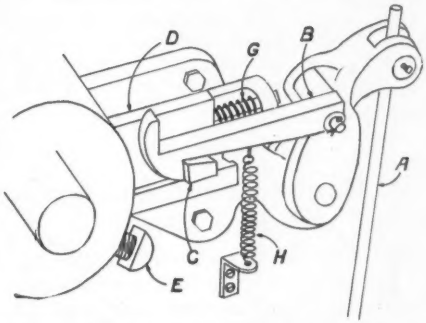


Fig. 2—Tripping device redesigned to form a "latch and kick-off" device, which prevents the press from repeating at a single depression of the foot pedal.

fingers or the tools, or both. And this has happened many times.

The drawing Fig. 1 shows the original design of the tripping device, which is a backward pull-type clutch slide. Fig. 2 shows how we redesigned it to form a "latch and kick-off" device. The feature of the device is that it will permit but one stroke of the press for each depression of the foot pedal.

In action, the operation of the device is as follows: when the foot pedal is depressed, the downward movement of the trip rod **A** pulls the latch **B** which is hooked over the lock **C** on the side of the slide **D**, thus withdrawing the slide and allowing the dog to engage the press flywheel clutch. As the kick-off **E** rises with the revolution of the flywheel, it strikes the end of the latch **B**, knocking it upward and allowing the slide **D** to snap back into place under pressure of the spring **G**. Thus the slide is ready to withdraw the dog at the completion of the revolution, regardless of whether or not the foot pedal is still depressed.

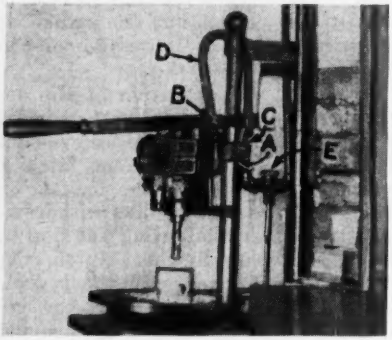
Before the press can be operated again, it is necessary to release the foot pedal and allow the trip rod **A** to rise until the latch **B** can again engage the block **C**. The block is tapered and the end of the latch is rounded so that, as the trip rod rises, the latch can slide over the top of the block. As it clears the end of the block, the spring **H** pulls it down so that it will engage the block.

A Handy Pneumatic Drill

By H. H. Henson

THE illustration shows how an emergency need for a small high speed drilling machine was met by rigging up an air motor with an air valve throttle and foot pedal assembly. A motor of the type commonly used around a locomotive repair shop comprises the principal part of the outfit, the motor being attached to a bench stand and controlled by means of an air valve that is operated by depressing a foot pedal.

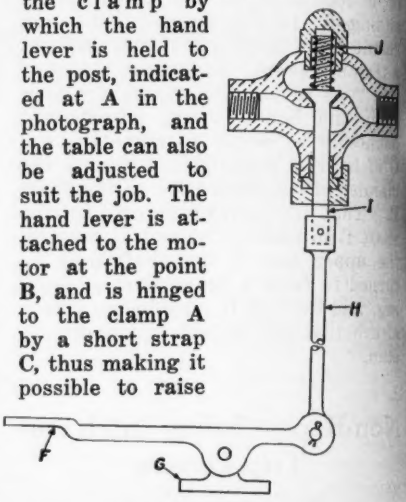
The pedal, which is hinged to the floor, is connected to the valve by



Emergency drilling machine made from an air motor.

means of a link as shown in the drawing. By arranging the mechanism so that the valve can be operated by the foot in this manner, the hands are left free to operate the lever and hold the work.

The motor can be adjusted to suit the height of the work by loosening the clamp by which the hand lever is held to the post, indicated at **A** in the photograph, and the table can also be adjusted to suit the job. The hand lever is attached to the motor at the point **B**, and is hinged to the clamp **A** by a short strap **C**, thus making it possible to raise

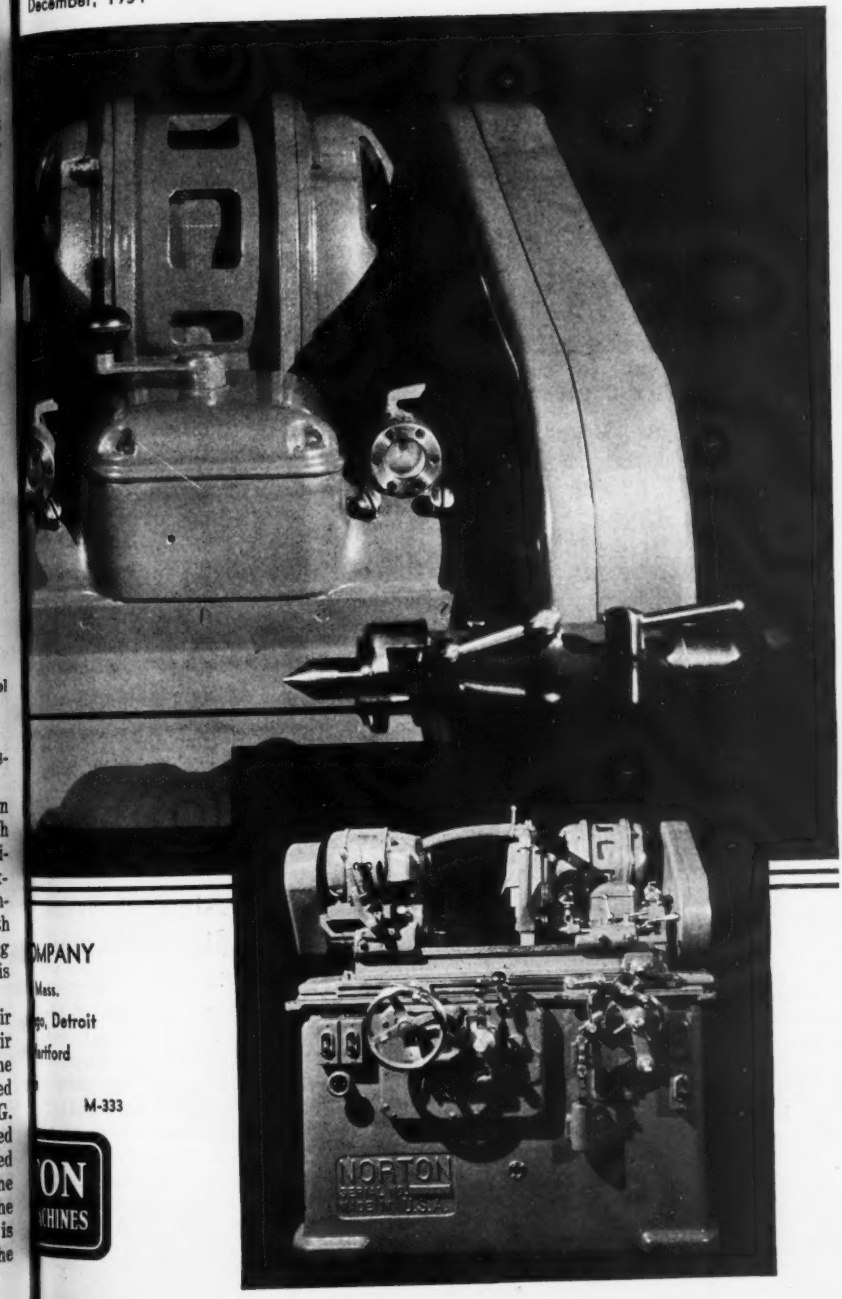


Cross section drawing of the air control mechanism for the emergency drill.

and lower the motor by simply raising and lowering the hand lever.

Air to operate the motor is drawn from the shop air-line, but inasmuch as the motor must be movable vertically, the air connection must be flexible. Accordingly, the motor is connected to the air-line by a short length of air-hose, **D**, the air supply being controlled by the valve **E**, which is operated by a foot pedal.

The drawing shows how the air throttle valve operates to supply air to the motor under control of the operator. The foot pedal **F** is hinged to the floor by the steel fulcrum **G**. To the end of the pedal is attached the connecting link **H**, which is coupled at the upper end to the stem of the air valve **I**. A spring **J** holds the valve in closed position. The valve is similar in design and operation to the



MPANY
Mass.
go, Detroit
rtford
M-333
ON
CHINES

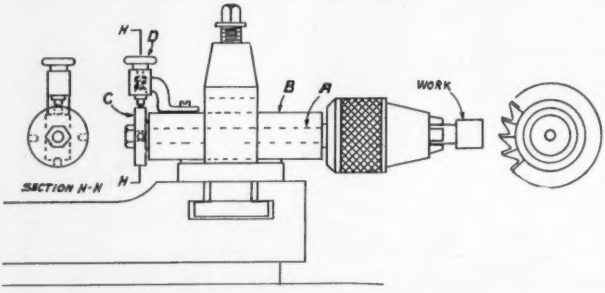
valve used to operate a steam whistle on a locomotive.

All that is necessary to operate the drill is to depress the foot pedal, raising the valve and allowing the air to flow through. The device is both simple and efficient.

Indexing Fixture for the Lathe

By Peter L. Budwitz

An indexing device that was designed and built for use in the tool post of a lathe is illustrated in the accompanying drawing. The device is intended to hold small screws and other parts for milling or slotting when a light milling machine is unavailable, the milling cutter being held on a stub arbor in the head-stock spindle or on a mandrel between the centers of the lathe.



Drawing of Indexing Fixture for Use in the Lathe

To hold the work, a drill chuck is mounted on the spindle of the fixture, indicated at A in the drawing. The spindle extends lengthwise through a reamed hole in the block B, which forms the body of the fixture. The block is made just wide enough so that it can be clamped in the toolpost of the lathe.

At the rear end of the spindle is the index plate C, which is held in place on the end of the spindle by a nut. The number of divisions required is governed by the number of holes in the periphery of the plate. The drawing shows four holes in the plate, but as many can be used as are required for the job in hand. When attaching the device to the toolpost, it is necessary to remove the plate from the spindle so that the block can be inserted in the opening in the toolpost.

To hold the spindle in the desired position, an arm carrying the spring pin D is attached to the top of the block in such position that the pin will be in alignment with the holes in the plate; thus the spindle can be revolved by lifting the pin and can be locked in position by dropping the pin into the correct hole.

As shown, the fixture is set to feed crosswise, or at right angles to the spindle of the machine. The ease with which work can be milled at an angle, however, recommends the tool even where light millers are available.

Simplified Design of Work Support for Jig or Fixture

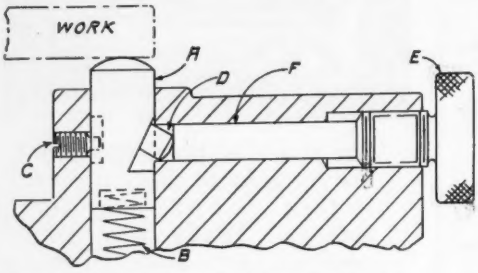
By J. E. Fenno

In order to reduce the cost of adjustable work supports in jigs and fixtures, and incidentally to improve the locking arrangement, the design illustrated in the drawing is standard practice in the drafting room of a plant with which the writer is familiar.

With the exception of the locking arrangement, the construction is similar to the ordinary type. Pin A, upon which the work rests, is a slide fit

in the fixture. This pin is held normally against the work by the coil spring B, and is prevented from turning by the screw-pin C.

Instead of the usual sliding wedge to engage the angular surface of the pin A, however, a hardened tumbler



Drawing of Work Support of Simplified Design

pin, D, is provided. The tumbler pin is moved to and from its locking position by the hand screw E. Pin D should be slightly longer than the diameter of the screw E through the section F, or so that its end will be free to contact squarely with the angular surface of support A.

As shown in the drawing, the work support is locked in position. To release the support, screw E is backed away, allowing tumbler pin D to drop out of contact with the support. Depressing the support will move the tumbler pin toward the right. In locking the support, the tumbler automatically assumes the position shown.

In the plant where it is used, this design, in addition to being more economical, is considered more positive in locking than the types of supports ordinarily used.

Halving Fractional Dimensions

By George Laidler

THE writer has often noticed what a bugbear it is to young mechanics and others to halve "mixed numbers" like 3⅝, where the whole number is "odd" and is followed by a "vulgar fraction".

The inexperienced person usually takes the half of 3, or 1½, and the half of ⅝, or 5/16, and mentally adds them together—and then goes over it again to make sure that it is 1-13/16. This method is slow and the trouble is with the half of the odd number.

The following rule should be better known. It applies only to the halving of mixed numbers where the whole number in front of the fractional part is odd, like 1, 3, 5. 7, etc.

To find the half of 3⅝, for instance, proceed as follows:

1. Set down the whole number obtained by dividing the 3 by 2, that is, 1. Disregard what is "over".
2. Now consider the fraction ⅝. Add these two figures, giving 13 above the fractional line.
3. Double the lower figure 8, giving 16 below the fractional line.
4. The combined result is what we seek, namely 1-13/16.

This sounds longer than it really takes. Try it with 5-7/16. Does the rule apply? Yes, for 5 is odd. Dividing 2 into 5 gives 2.7 plus 16 equals 23. Twice 16 equals 32. Result, 2-23/32.

By this method the answers can be set down without hesitation and with complete certainty.

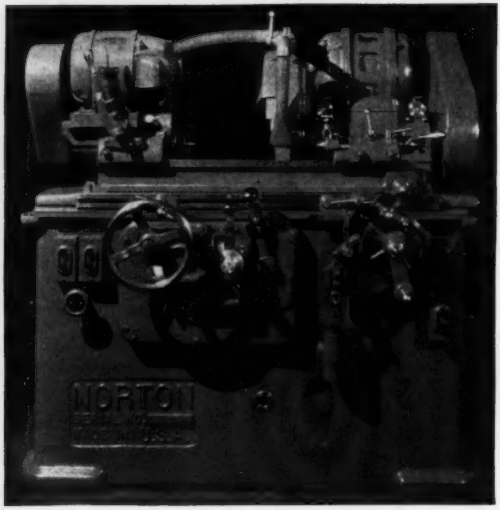
Over the Editor's Desk

THESE are eventful days. The ranks of the New Dealers have been reinforced as a result of the November election. They can't complain that they haven't been given a free hand; if they don't produce results now, it will be their own fault. * * * Removal of restrictions against the movement of American currency to foreign countries is interpreted as stabilization of the dollar. Thus that so-called barrier to confidence is eliminated. * * * The fact is that, because of growing international confidence in the American dollar, it is reported that stocks of gold have accumulated here to such a point that treasury officials are worried. * * * A report presented to Secretary of Commerce Roper indicates that the small industrialist is being discriminated against in the matter of credit. The report is said to recommend coordination of all banking through the Federal Reserve and establishment of intermediate credit banks with a $200,000,000 credit pool for small industry. * * * It is evident that prosperity has rounded the corner in New York City, at least. Top hats and tail coats are in evidence everywhere, and some 26 theatrical productions are packing them in at prices which prevailed Before the Depression. * * * A survey by Standard Statistics Company shows that nineteen companies have started or planned $120,000,000 of capital expenditures since the first of the year for expansion. * * * This doesn't indicate lack of confidence. * * * Roger Babson, well-known economist, points out a number of definite signs of improvement in business; i.e., private and corporate debts are being reduced; there is an increase in moneys available for expansion; inventories have steadily been declining; department store sales are increasing; in October, 1934, 43 major companies declared dividends against back accumulations as compared with only 18 in October, 1933; the industrial power consumption for the country is well ahead of a year ago, and domestic power consumption is at the peak for all time; business failures are at a very low level; collections are distinctly improving; labor troubles have dropped off sharply; the total income of the farmers will be in excess of six billion dollars for 1934 as compared with five billions a year ago. * * * More than $60,000,000 has been paid out to tobacco planters of North Carolina in recent weeks, and this will amount to $72,000,000 before the year is over. * * * This amount is nearly five times the amount received in the 1931-32 season. * * * The pessimist should put that in his pipe and smoke it. * * * The Chamber of Commerce of the United States, conceding the necessity of working in cooperation with the Administration, has been working on plans for a program to be submitted to the President. * * * The 1934 income of the American people is estimated by leading trade analysists to be approximately $9,000,000,000 more than 1933. * * * The automotive industry is betting millions of dollars that 1935 will be a record year for production of motor vehicles. * * * Ford Motor Company will spend $15,000,000 for equipment. Ford has already ordered $1,000,000 worth of machine tools and will soon buy another $1,000,000 worth. * * * Packard has set aside $6,200,000 for capital expenditures. * * * Olds is equipping to produce 150,000 cars next year; has budgeted $2,500,000 for equipment. * * * National Steel Company will spend $12,000,000 to expand its facilities for the production of steels for the automobile industry. * * * Altogether, it looks like a good year ahead.

NEW SHOP EQUIPMENT

Norton 6-in. Type C Cylindrical Grinder

Norton Company, Worcester, Mass., announces the addition of a new cylindrical grinder to its Type C line. The machine has a nominal swing of 6 inches and is built in either of two lengths, to take a maximum of 18 inches or 30 inches between centers.



Norton 6-Inch Type C Cylindrical Grinder

Patterned after the 10-inch and 16-inch Type C machines announced earlier in the year, the 6-inch machine has a self-contained wheel unit and uses a standard 20-inch diameter grinding wheel. The wheel spindle, which is 50 per cent heavier than in earlier 6-inch machines, is end-driven by vee belts direct from the mounted motor, no idlers or intermediate shafts being required. Spindle bearings are of hard bronze and are flood-lubricated with filtered oil. Spindle reciprocation is optional. Wheel-slide ways are force-feed lubricated and have 20 per cent greater bearing areas than earlier models.

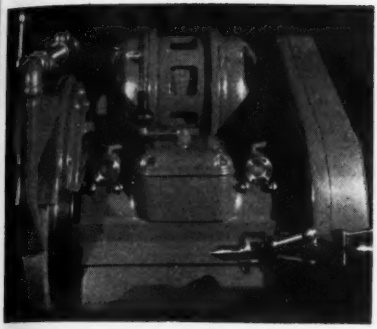
The work carriage consists of a sliding table traveling in a vee and a flat way in the base which supports a swivel table pivoted to it at the center. Both table ways are force-feed lubricated.

The headstock, footstock, steadyrest, center pointer and radial truing device are clamped to the swivel table. Headstock and footstock centers are larger. The footstock is lever-operated, the length of both the lever and its handle having been increased to facilitate operation. The headstock is driven by an adjustable-speed D. C. motor with either a rheostat or drum controller to provide a wide range of work speeds. In addition, a lever which operates a clutch and brake is provided. This lever is now arranged vertically instead of horizontally, making operation easier.

Power traverse machines are hydraulically propelled, the oil pump and its driving motor being an integral unit mounted within the base. The reverse and throttle valves are of the same design as used on the larger Norton Type C machines. The table is traversed by a double rodded-piston connected to each end with a quick-acting latch. The piston travels in a cylinder that is attached to the base, and table speeds from 7 to 360 inches per minute are available.

The table can also be moved by a hand wheel which is automatically disconnected when the power traversing units are engaged. The quick-acting latches permit disconnecting the piston altogether, thus affording a means of operating the table by hand independent of the hydraulic system.

For plunge-cut operations only, a hand traverse unit is substituted for the power traverse elements. This unit has a slow speed for wheel truing and a fast speed for moving the table into grinding position if necessary. The change from one to the other is easily and quickly made by means of a knob located on the hand wheel.



Wheel Head for Norton 6-Inch Type C Grinder

Both hand and power traverse machines can be equipped with a hydraulically-operated wheel head traverse unit. The unit moves the wheel head rapidly in and out between grinds as much as 3 inches if required. The 30-inch machine, complete with all motors and standard equipment, weighs approximately 4,700 pounds and requires floor space 4 ft. 9 inches by 9 ft. 4 in.

Steelweld Vertical Press Type Bending Brake

The Steelweld Machinery Company, Machinery Ave. at East 70th Street, Cleveland, Ohio, announces a new design in vertical press type bending brakes, using box type steel welded housings with deep throat and with the flywheel mounted between the housings. The standard throat is 18 inches.

The manufacturer claims to have developed a bending brake which, in case of accidental overload, will stall without danger to the machine. The deep throat not only enables the user to turn up much larger flanges than have hitherto been customary in this type of machine for the entire die length, but it also provided a means of giving the design a certain resiliency. Work much longer than the normal capacity between the housings can be handled with ease. Not only are the side sections box housings, but the crown is also in the shape of an open box reducing the height and tieing the frame together very substantially.

All sizes are twin-gear driven and the eccentric shafts are solid forged, the eccentrics coming immediately above the ball joints. The ball joint is a steel cylinder welded right into the ram, claimed by the manufacturers to be proof against damage. The clutch and brake are both Twin Disc and are mounted on opposite sides of the housing to prevent overheating. The flywheel is also so drilled that it air-cools the clutch.

The ram can be swiveled so that on a 10-foot machine, taper work up to ¼ in. taper per foot can be done. The ram swivels on the guide and does not cause any cramping action thereon. Only one guide is gibbed laterally to the housing, the opposite guide having clearance to prevent cramping in case the ram is tapered. The machine is provided with the customary micrometer dial gauge to

Steelweld Vertical Type Bending Brake

indicate settings, which has been a feature of all Steelweld brakes. All bearings except the mains and slides are roller or ball bearings.

The tool is designed so that no simple or compound stress in any member shall exceed 7500 lbs. to the square in. and no bearing pressure shall exceed 2500 lbs. The tongue slot for bed and ram shall be in alignment parallel and straight, within the limit of 0.002 to the inch in either ram or bed. The machine is equipped standard with removable clutch pedal to eliminate danger in resetting dies and is attachable without the use of wrenches or other tools, at a moment's notice, at any position in the front of the bed. The ram positioning mechanism is located in the back of the ram, out of harm's way. Worms are hardened and ground and running on ball bearings, operating in an all-enclosed case. Worm gears are of high grade bronze, as are also the adjusting nuts.

Economax Upright Drill

The Fosdick Machine Tool Company, Cincinnati, Ohio, has brought out the drilling machine shown in the illustration, to be known as the Economax Upright. The machine is designed to meet the demand for single purpose operation, but can also be used for general drilling. It is supplied either with a motor located on a built-in base at the rear of the machine, as shown in Fig. 1, or with a motorized spindle as shown in Figure 2.

The machine shown in Fig. 1 has 12 speeds in geometrical progression with a range of from 60 to 1500 r.p.m., which are instantly obtained by shifting a single lever while running. The lever indicates the exact speed of the spindle for each position. Only twelve gears are employed in the entire unit. These are of the selective sliding type transmission, of heat treated alloy steel, mounted on full ball bearing, multi-splined, chrome nickel shafts. A spray of oil from a submerged constant speed pump insures complete lubrication to every moving part.

The spindle is also multi-splined and is driven by a long alloy steel heat treated sleeve which extends completely through the gear housing. The spindle nose has a No. 4 Morse taper. This sleeve carries but two gears—one for the high speeds and the other for the heavy back gears—rigidly mounted between ball bearings, there being no sliding gears on the spindle. The spindle is also full ball bearing mounted. The rack teeth are cut directly in the sleeve, bringing the pressure of the downward feed closer to the center of the spindle and allowing for wider faced pinion. An outstanding feature is that the twelve speeds 60 to 1500 r.p.m. are obtained from a constant speed motor of any speed.

The drive from the motor goes directly through pinion and gear, to the start, stop, and reverse frictions. These are of

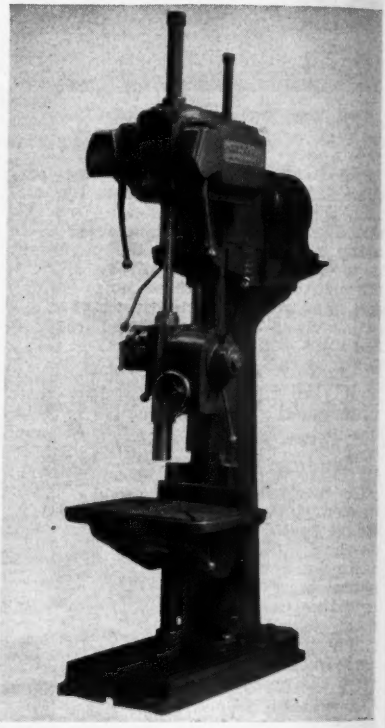


Fig. 1—Economax Upright Drilling Machine

the multi-disc type and run at a constant speed. The frictions are ball bearing mounted, on a multi-splined horizontal shaft, eliminating drag or chatter.

Nine feeds are available from .005 in. to .043 in. per revolution of spindle, all of which are controlled by a single lever with direct reading index. All the gears and shafts are alloy heat treated, multi-splined and full ball bearing mounted. All gears are of the sliding type. The

feed gears and bearings are sprayed with oil which is supplied by the same pump that lubricates the speed gears. The positive feed clutch is very sensitive and powerful, and makes the tripping at a pre-determined depth absolutely accurate.

The sliding head is of an exceptionally heavy design, and is held to the column by a self-compensating single lever clamp. The feed mechanism is totally enclosed but readily accessible.

The round column is additionally braced at the center of the rear support which greatly increases the rigidity. The

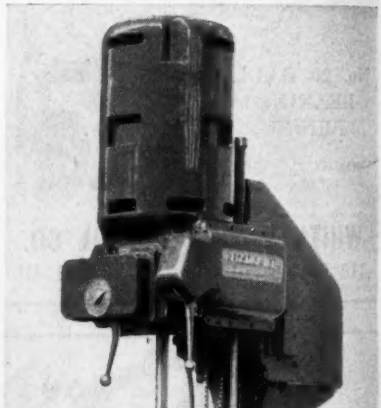


Fig. 2—Economax Upright Drill With Motorized Spindle

box column in made in one piece to eliminate any tendency to bend and distort when doing heavy drilling. The table is fitted to dovetail ways and is raised and lowered by a telescopic screw. A single lever located at the front clamps the table.

An individually driven coolant pump can be supplied. This pump is bolted to the base and submerged in the lubricant. Chip pan can be furnished if desired for either round or box column machines.

The motorized spindle upright drill supplies any number of spindle speeds from one to eight with a range of 75 to 1800 r.p.m. One to nine feed changes can be had with a range of .005 in. to .043 in. per revolution of spindle. Larger feeds can be had if desired. All speed

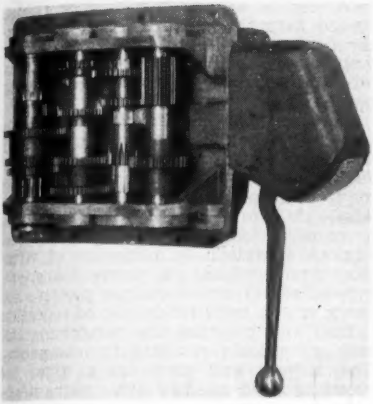


Fig. 3—Feed Box With Single Lever Shift

and feed changes are made by means of single levers. Reverse to spindle for tapping is accomplished through a reversing switch located on the sliding head.

Duplex Rivitor

A riveting machine which makes possible a complete job of riveting in a single operation, in that it automatically punches a hole, inserts a rivet, and heads it without moving the work, has been placed on the market by The Tomkins-Johnson Company, Jackson, Michigan. According to the manufacturer, the best practices used in punch press design have been ingeniously combined with advanced methods of automatic feeding and heading, resulting in a machine with which both speed and precision are obtained.

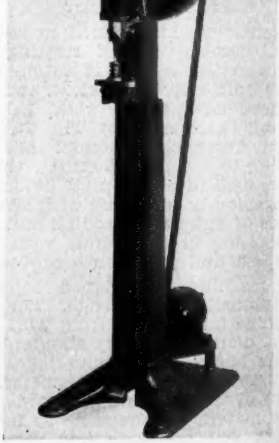
The machine is designed to handle solid, tubular, or split rivets. The Model A machine takes rivets from 3/32 in. to 3/16 in. diameter, in any standard head, and the Model B machine takes rivets from 3/16 in. to ¼ in. diameter. The capacity of the machine as regards thickness of material is the same as for press work; it will perforate and rivet mild steel of a total thickness equal to the diameter of the punch.

In operation, the work is tightly compressed, perforated, the rivet is inserted, and then headed. The punch holds the materials in alignment until forced out of the hole by the rivet. Perfect alignment permits the rivet to be driven into a tight hole without peeling or tipping.

resulting in a perfect job. The rivet is forced into the hole under to a pre-determined pressure and this pressure is maintained until the rivet is headed. An air-tight joint is produced and flashing between plates is eliminated.

The rivets are handled in the machine by a new type of jaw which, immediately upon receiving the rivet, grips it tightly and forces it into the hole without allowing it to drop out, or to be inserted crosswise. A simple, direct drive through a carefully-balanced flywheel provides smooth operation, a minimum of vibration, and economy of power. A special type of safety clutch assures positive and quick action with no danger of repeating.

Dies and punches are interchangeable and are quickly removed for sharpening. The hopper and rivet track, rivet jaw assembly, and the few other parts necessary to change rivet sizes may be removed and set up for a new rivet within a few minutes.



The Simplex Rivitor

Simplex Rivitor

The Simplex Rivitor, built by The Tomkins-Johnson Company, Jackson, Michigan, is similar in design to the Duplex Rivitor described above, the essential difference being that the

Simplex Rivitor is built to include certain features that make it especially adaptable for the handling of solid rivets. It is built to withstand the many abuses usually found in the production plant, where the saving in cost of solid rivets over the tubular type is an item of considerable interest.

The Simplex Rivitor can be furnished to automatically feed and set either solid, tubular, or split rivets in sizes from 3/32 in. to and including ¼ in. in diameter, of various lengths and heads. An outstanding feature of the machine is, however, the method of heading solid rivets. Work placed on the anvil is backed up by a resistance mechanism. The rivet inserted into the hole—against this resistance—compresses the work together through the forces applied to the rivet head against this resistance. The work, consequently, is forced downward under this pressure upon the anvil and head, producing a perfectly tight joint without flashing. The hole is entirely filled, and a perfect head is produced without distortion.

The possibility of the rivet turning over or crosswise is eliminated by a new type of jaw. A positive selector assures a rivet at each operation of the machine, and a dependable hopper provides a full supply of rivets at all times. The drive and clutch are the same used in the Duplex Rivitor. The machine is operated by a foot pedal. The stroke of the pedal is short and requires but little pressure; thus both hands are free to manipulate the work.

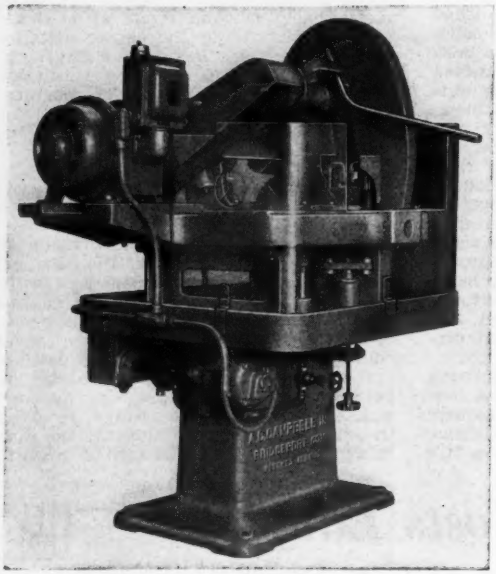
The Simplex machine can be furnished to feed and set two rivets at a single operation, providing the center distance of the rivet holes is not too great. In many cases, dial indexing mechanism and fixtures can be attached to the machine. The dual machine is identified as the Model AA.

Campbell Wet Abrasive Cutting Machine

The Andrew C. Campbell division of American Chain Company, Inc., Bridgeport, Conn., has developed a cutting machine which is unique in the method used for supplying the cutting disk with coolant. The disk by its own speed collects the proper amount of coolant and directs it against and into the cut being made. Continuous and uniform quantities of liquid are assured, resulting in equal wear on both sides of the disk, longer disc life, elimination of burning

or surface hardening, improved finish on cuts, and reduction in cutting costs.

The machine is specifically intended for the cutting of such materials as alloy steels, non-ferrous alloys, plastics, and many other materials in solid bar up to three inches in diameter or tubings up to three and one-half inch diameter.



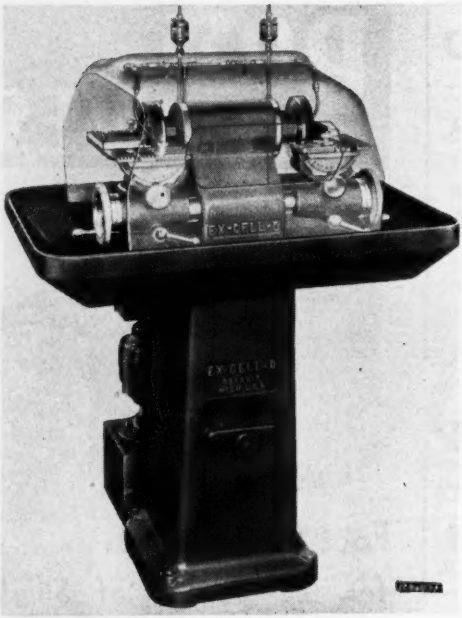
Campbell Wet Abrasive Cutting Machine

The machine is made in two models. The No. 202 is built with a work clamp which is operated by foot treadle, and the No. 203 has an automatic electrically operated clamp. Both models are built on pedestal bases and all moving parts are protected yet easily accessible.

Ex-Cell-O Cemented Carbide Grinding and Finishing Machine

The illustration shows a machine which has been announced by the Ex-Cell-O Aircraft & Tool Corporation, 1220 Oakland Blvd., Detroit, Michigan, for the grinding and finishing of cemented carbide tools. The features of the machine are said to be (1) reduction in the time required for sharpening cemented carbide tools; (2) production of a keen, sharp cutting edge with a smooth finish; (3) material increase in the cutting life of the tool; (4) removal of absolute minimum of depth of tungsten or tantalum carbide at each sharpening; (5) elimination of grinding checks and cracks due to fact that generated heat is completely controlled; (6) ability to grind tips to thin sections without danger of chipping and breaking. The machine is said to operate in such manner that the surface is ground to the final finish, thus keeping a keen edge.

The machine is compact and sturdy, reducing vibration to a minimum. An inbuilt balanced ¾ h. p. electric motor is mounted at the top of the machine, supplying power to drive two impregnated wheels. This type of wheel is now available in three grades; coarse, fine, and extra fine. The grade of wheel used depends upon the finish required and the amount of stock to be removed.



Ex-Cell-O Cemented Carbide Grinding and Finishing Machine

The motor shaft is mounted in Ex-Cell-O precision ball bearings, eliminating end play. Coolant is supplied to each wheel by means of an electrical motor driven pump, or direct from the city water pipe lines, as the customer desires.

A reversible switch on the motor provides for correct rotation of the wheels for right or left hand tools. The tool support tables at each end of the machine are provided with hardened and ground strips, forming a smooth table surface. Graduated adjustments on each table provide an easy and accurate method of maintaining the correct rake and angle on the tool.

Provision is made for the return of the water from the diamond wheels and a large guard in the form of a hood covers the spindles and wheels, the hood being shown in phantom in the illustration. Each end of the guard is open, allowing the use of the entire length of the table. Sliding doors in the guard permit the operator to hold the tool parallel with the face of the wheel when required.

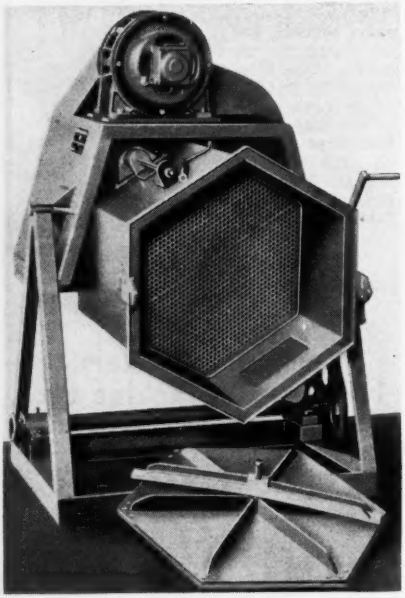
Ransohoff "Ideal" Burnishing Barrel

A burnishing barrel that makes available to the operator who handles small batches the economies effected by automatic transfer of burnishing balls is announced by N. Ransohoff, Inc., Cincinnati, Ohio. Hitherto the "Ideal" system by which balls and work are automatically separated and balls recharged into the burnishing section without manual handling has been confined to barrels required by finishing departments operating on large batches.

The "Ideal" barrel may be charged with large work (as large as the barrel will accommodate) by removing the barrel head, which is held in place by a single central screw. Small work is loaded through the small door. Loading is accomplished with the door up and unloading with the door down, discharge being made directly to tote pans under the machine. The hexagonal burnishing compartment is 12 in. deep, the hexagon measuring 24 in. side to side. The ball

compartment is behind the perforated brass plate shown in the illustration.

When the barrel is loaded it is tilted to approximately 5 deg. below horizontal, tilting being effected by means of the crank at the right. The barrel is now rotated in burnishing direction, which



Ransohoff "Ideal" Burnishing Barrel

brings the balls from the compartment in the rear to the burnishing section. A patented head and ball passage brings the balls into a space 1 in. wide between the patented head and the perforated plate, through which the balls work into the burnishing compartment.

When burnishing is completed, a turn of the crank tilts the barrel to 10 or 15 deg. above horizontal and rotation is reversed. This causes the balls to sift out of the work, through the perforated plate, and the patented head returns them to the ball compartment. Cupped work is separated from balls in from five to seven minutes. A hollow shaft permits work and balls to be rinsed in the barrel during rotation, which is done when the barrel is tilted up and is in reverse. Water is introduced into the burnishing compartment, drains through the screen into the ball compartment where it leaves through a valve which is shown in the illustration on top of the barrel. The outlet is screen-protected to prevent the escape of balls. Work is unloaded, as already indicated, through the door and the barrel is ready for another operating cycle. No labor is required for handling balls. Because a heavier load of balls can be economically used, finishing is achieved more rapidly and the quality of the work is said to be greatly improved.

The "Ideal" barrel is furnished with wood or ¼-in. abrasion-resisting rubber lining, or unlined.

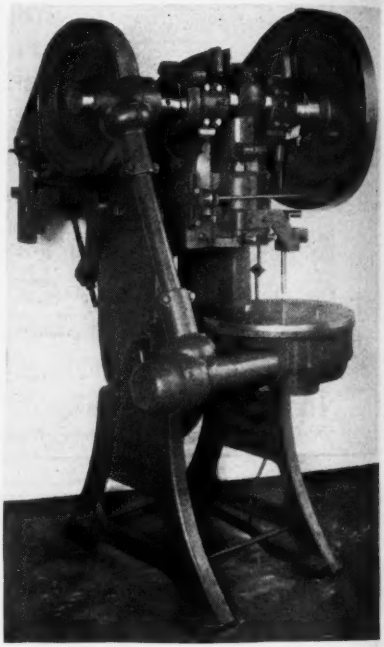
"Federal" Dial Feed

The Federal Press Company, Elkhart, Ind., has placed on the market a dial feed for punch presses that has many features of safety as well as of performance. Every moving part is completely housed, thus affording complete safety to the operator. The dial has also been designed so that tooling jobs can be interchanged with the ease of changing ordinary die sets.

One of the features that aids in the changing of jobs is the fact that the

dial plate is independent of the indexing mechanism. The dial plate is easily removed and any number of dial plates can be used.

The positive indexing and smoothness of operation facilitate high speeds, and



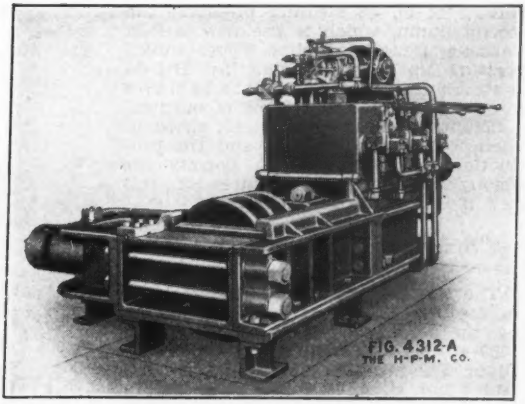
Press Equipped with Federal Dial Feed

the indexing mechanism is so completely protected from dirt and chips that accuracy is maintained regardless of the type of work being run. The dial is

skid proof, yet does not employ brakes or locking pawls for stopping the dial correctly. It is also possible to index the dial in one-fourth of the revolution of the crankshaft, thus allowing longer rest or loading periods between the indexings.

H-P-M Scrap Metal Baling Press

A recent development of The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, designers and builders of H-P-M Hydro-Power Presses, is a Box-Type Scrap Metal Baling Press, incorporating the H-P-M Hydro-Power principle of operation. The press is completely self-contained, with its motor-driven H-P-M Hydro-Power Unit mounted directly on the press at one end.



H-P-M Scrap Metal Baling Press

The press consists of a box built up of massive ribbed steel castings to take the loose scrap metal. It is closed by a heavy sliding door, actuated by a hydraulic cylinder. Pressure is applied to the scrap from two directions—first from the end, and then from the side by platens moving into the box, operated by hydraulic rams. The application of the pressure is controlled through three lever-actuated valves.

Two pumps, each of the rotary high-speed oil pressure type, build up the pressure. The first pump delivers a large

volume of oil at medium pressure; the second pump, which is the new H-P-M Variable Delivery Radial Type, builds pressure up to maximum. An H-P-M control automatically regulates the pump's pressure and volume of output.

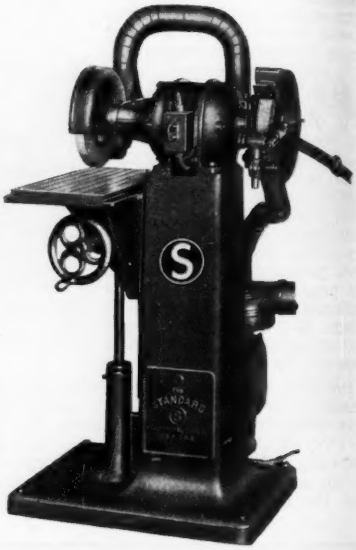
Compactness, smooth action, speed of operation, ease of control, and the production of bales of high density are among the desirable features of this new H-P-M Scrap Metal Baler.

"Standard" Surface and Tool Grinder

The Surface and Tool Grinder shown in the illustration has been brought out by the Standard Electrical Tool Co., 1938-48 West Eighth St., Cincinnati, Ohio. The machine is available in 1 h.p. and 2 h.p. sizes, equipped with 10x1-in. and 12x1½-in. grinding wheels, respectively.

The table of the machine is 11x21 in. in size. Five turns of the hand wheel adjusts the table 1 inch. The hand wheel spindle is fitted with an adjustable dial, graduated by thousandths of an inch. The maximum distance from wheel to table is 12 inches.

The base of the machine is 20x28 inches, and the net weight is 549 pounds. The illustration shows the machine



"Standard" Surface and Tool Grinder

equipped with a twist drill grinding attachment and exhaust blower attachment, which is optional.

Dumore No. 9 Hand Grinder

The Dumore Company, 28 Sixteenth St., Racine, Wisconsin, announces a hand grinder of unusual power and designed for production grinding of large and small dies and molds, for cleaning up weld

om Good Companies . .

logical thing for us to take advertising space in your paper."

HERE again is definite evidence of the result-producing ability and enthusiastic reader interest in MODERN MACHINE SHOP. The results proved to the Manley Products Corp., York, Pa., that this publication reaches and is read by the key men in the kind of companies with whom they want to do business. Accordingly, MODERN MACHINE SHOP has been selected to carry their messages to industry.

With a monthly circulation of over 25,000 copies, MODERN MACHINE SHOP reaches the mechanical executives in more than 20,000 metal-working plants.

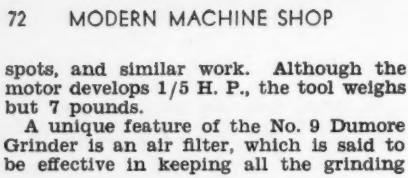
For maximum market coverage, tangible results, and economy in advertising, place your sales messages in MODERN MACHINE SHOP starting with the January issue. Send copy promptly. Forms close Wednesday, December 26.

MODERN MACHINE SHOP

704 RACE STREET
CINCINNATI, OHIO

spots, and similar work. Although the motor develops 1/5 H. P., the tool weighs but 7 pounds.

A unique feature of the No. 9 Dumore Grinder is an air filter, which is said to be effective in keeping all the grinding



Dumore No. 9 Hand Grinder

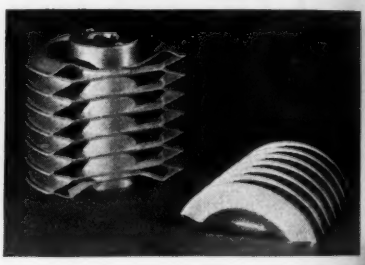
dust and dirt out of both the motor and the bearings. The filter is enclosed in the end cap and can easily be removed, cleaned and replaced. This feature is intended to eliminate necessity for repairs, and to increase the life of the tool.

The grinder is equipped with a vacuum cleaner type of ventilating fan which prevents heating even when the tool is used on production work. The tool is equipped with three ball bearings and operates at a speed of 14,250 r.p.m. It can be supplied with either the spade type of handle shown in the illustration or with a handle mounted on the side. Standard equipment includes a wheel arbor, chuck for mounting the wheels, small extension spindle, and two grinding wheels.

Duro-Brace Texsteel Sheave

Under the name of Duro-Brace Texsteel Sheave, the Texrope Division of Allis-Chalmers Manufacturing Co., Milwaukee, Wis., is introducing the reinforced steel sheave shown in the illustration.

In designing the Duro-Brace Texsteel Sheave, consideration was given to the fact that the outside walls of sheaves sometimes bend under the strain of ex-



Duro-Brace Texsteel Sheave

cessive overloads, with the result that they are thrown out of true. The possibility of this difficulty has been precluded in the construction of the Duro-Brace Sheave by reinforcing the outside walls of the sheave with a convex steel plate which strengthens the vulnerable areas to such a degree as to practically eliminate the possibility of distortion, irrespective of the strains to which they may be subjected.

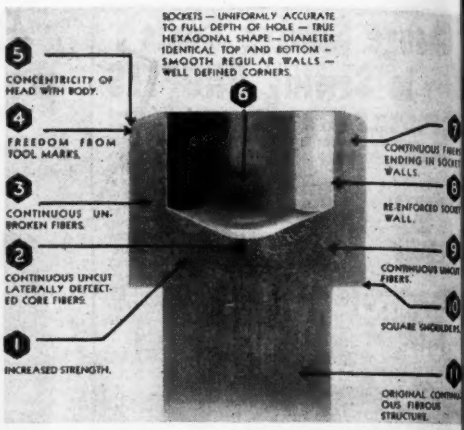
Welding at the rim and web, for addi-

tional strength, and the interior grid-type construction, for rigidity, which were advantageous features of the former design, are retained in the design of the duro-Brace Texsteel Sheave.

"Fibro Forged Screw"

Holo-Krome Screw Corporation Bristol, Conn., has announced a socket screw which is being marketed under the trade name of "Fibro Forged Screw." The feature of the screw is the method of manufacturing, which is such that the material in the screw is left in continuous, uncut fibers, neither severed nor broken, from one end of the screw to the other.

As shown in the accompanying illustration, the continuous fibers in "Fibro Forged Screws" give the maximum of strength to those parts of the screw where it is most needed.

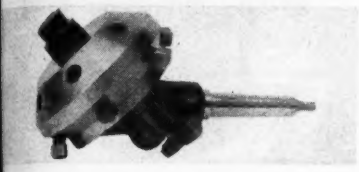


Cross-section of the "Fibro Forged Screw", showing how the steel is forged without breaking the fiber.

In connection with this feature, the quality of the screw is further increased through control of the grain size in the steel and through atmospherically-controlled electrical heat treatment—a combination that is said by the manufacturers to produce a material of the highest possible quality.

Lathe Turret Head

A lathe turret head designed to hold six tools and equipped with a spindle with a Morse taper shank, as shown in the illustration, has been placed on the market by Tom's Machine Shop, 410 Niagara St., Niagara Falls, N. Y. Tools



Lathe Turret Head

with ¼-inch shanks can be used, and the turret is intended to make possible the use of six tools without changing the holder, as is necessary when a single tool at a time is used in the tailstock of a lathe.

As each tool in turn is swung to alignment with the center, the head is locked in position by means of a positive spring lock. The lock operates with a spring which provides for easy release and in-

stant locking. Setscrews hold the tools in their respective positions in the head, as shown. The tool is supplied with either Morse No. 2 or No. 3 taper shank.

"Beaver Quality" Pipe Tools

Five new tools that have been placed on the market by the Borden Company, Warren, Ohio, are illustrated herewith.

The No. 200 Beaver Swivel Pipe Reamer is designed with a simple swivel action which is said to be an improvement over older designs. The handle and knob are of the highest grade malleable iron and are practically unbreakable. The reamer head is of alloy steel, heat treated, and will ream a ⅛ in. to 2 in. pipe. The tool is said to be of unusually fine quality and strong construction.

Fig. 1—Beaver No. 200 Swivel Pipe Reamer

The No. 6-R Beaverette Ratchet threads ¼, ⅜ ½, and ¾ in. pipe without changing dies or bushings, and is especially valuable for use in ditches, corners, or close to walls. The tool is instantly adjusted for cutting over-size or under-size threads. The universal pipe guide centers the pipe accurately and the tool is so designed that close nipples can be cut. The locking device is located on the top of the tool. The tool carries two sets of dies, to accommodate two different thread pitches, and provides for either right or left operation. Dies are available for ⅛ in. extra if desired.

The No. 70 and 72 Series Beaver Pipe Dies are said by the manufacturer to be ideal for brass and copper pipe as they will not mar the pipe. The tool is designed to permit the use of the full width of the dies. The die throw-out insures uniform threads and saves backing off. The dies are of the segmental type which can be resharpened. The tool is fully adjustable, right or left.

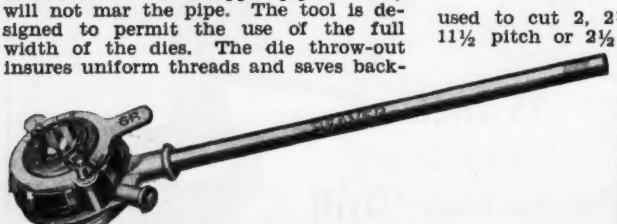


Fig. 2—No. 6-R Beaverette Ratchet

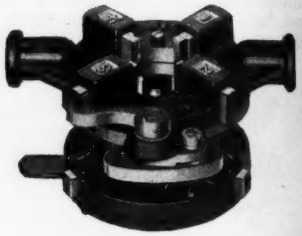


Fig. 3—No. 70 Series Beaver Pipe Die

The No. 38-R Beaver Ratchet Die is constructed to afford a straight line pull, making for easy and smooth operation, sharp threads, long die life, and a minimum of repair expense. The dies are located at the top of the tool, allowing for ease of oiling and instant pitch clearance. A separate set of dies is used for each size of pipe. The tool is equipped with a patented grooved-bolt centering device, eliminating loose bushings. The tool is for right hand only, and can be used to cut 2, 2½, and 3 in. threads 11½ pitch or 2½ and 3 in. threads, 8 pitch.

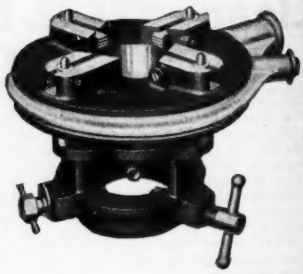


Fig. 4—No. 38-R Beaver Ratchet Pipe Die

In order to aid in the cutting of pipes so that a square end will be produced, the firm has developed the square end sawing vise shown in the illustration. The No. 2 size, which is made of alum-

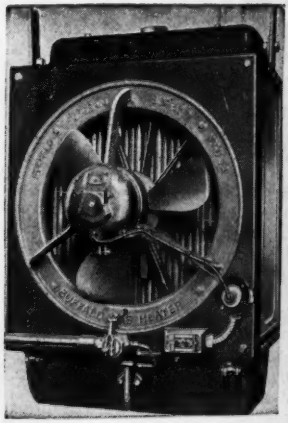
inum, has a range of ⅛ to 2 in. Th No. 4 size, which is of malleable iro has a range of 1½ to 4 in. Both tool

Fig. 5—Beaver Square End Sawing Vise

are self-contained and simple to us with a standard hacksaw. The saws ar equipped with renewable steel insert which will not mar nor crush tubing.

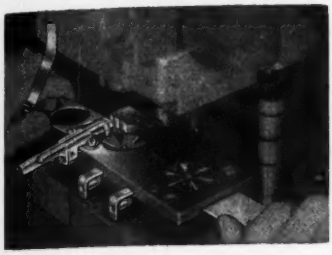
"Buffalo" Gas Unit Heater

The heating problem in any shop large or small—can be solved economical and efficiently by the use of "Buffal gas unit heaters. The "Buffalo" heat made by Buffalo Forge Co., 388 Broadwa



"Buffalo" Gas Unit Heater

Buffalo, N. Y., burns either natural or artificial gas, and provides uniform, controlled, forced circulation of warm air at the temperature desired. Automatic temperature control and safety features

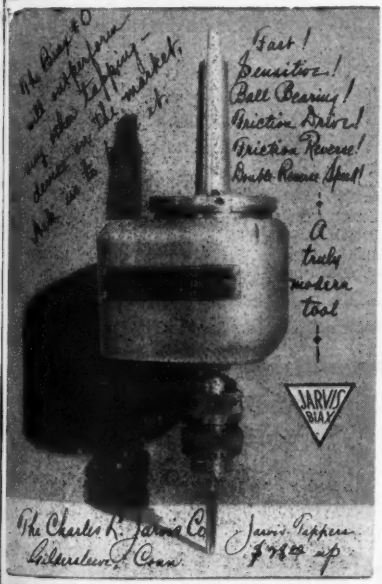


$1.00 will bring you this Automatic Stop . . . the most economical stop for blanking dies. SAVES 75% of your automatic stop cost. Can be fitted to any blanking die in 25 minutes. Conventional design . . . strong . . . simple. Send your order today.

Automatic Stop $1.00 each
Primary Stop $0.30 each

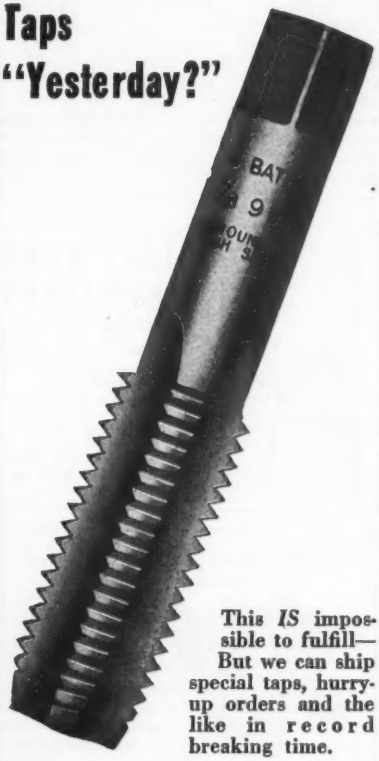
(Discount 15% on dozen lots)

R. KRASBERG & SONS MFG. CO.
2310 WOLFRAM ST., CHICAGO, ILL.



The Charles L. Jarvis Co., Gildersleeve, Conn.

Do You Need Taps "Yesterday?"



This *IS* impossible to fulfill—But we can ship special taps, hurry-up orders and the like in record breaking time.

They will be "Ground from the Solid *after hardening*"—they will give you amazingly long life and cut clean, accurate threads.

It will be a pleasure to help you with your tapping problems and we believe you will find it profitable to use Bath taps.

We welcome your inquiry.

JOHN BATH & CO., Inc.
WORCESTER, MASS.

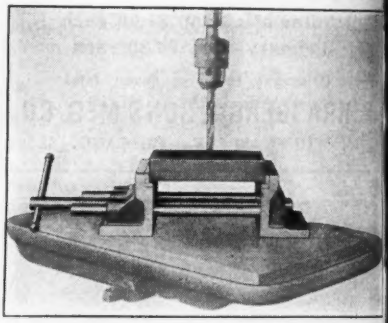
reduce the consumption of fuel to the minimum for the amount of heat desired.

The gas heater unit is easily installed and the initial cost is low, eliminating boiler room, fuel storage, and auxiliary equipment. No special knowledge is required and no time is needed to operate the heater; it is started or stopped by pushing a button. Connections to the gas and electric lines are the only connections required. The gas shuts off when the fan stops, and feeds again with the resumption of current. However, if for any reason the gas supply fails, the fan shuts off and will not start until the pilot is lighted again.

Buffalo Suspended Gas Unit Heate are available in four sizes. Motors an control can be furnished for 110 or 22 volt, 60 cycle, single phase, or 110 or 12 d. c. current. Standard equipment in cludes pressure regulators and automati safety features but no thermostat. I place of the standard adjustable louvre a 45-degree elbow to deflect the air downward at high velocity can be furnished The amount of gas consumed can b controlled, providing economical operation in mild weather.

National "Handy" Drill Press Vise

A drill press vise designed with built-in parallels and so built that chips cannot get into the working parts has been placed on the market by The National Machine Tool Co., Racine, Wis. Although



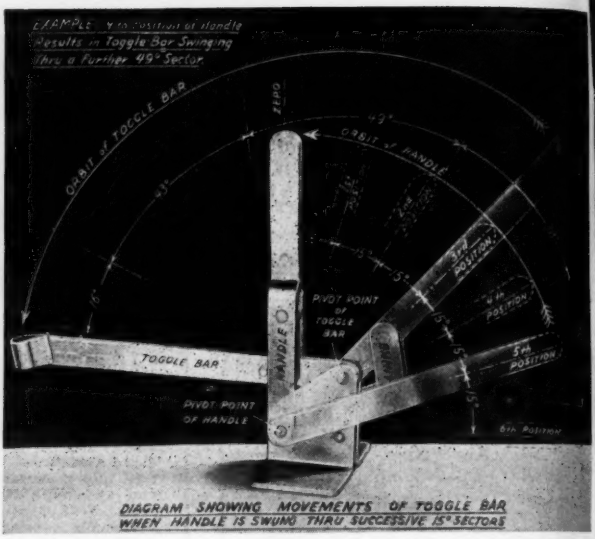
National "Handy" Drill Press Vise

comparatively light, the vise is of sturdy construction and is intended to withstand the gruelling service incidental to high production in the machine shop.

Although provided with slots for bolt-

ing to the machine table, the vise is accurately machined on both sides so that it may be used while resting on the base or on either side. The jaws are mortised and fitted with hardened steel plates upon which the work can be held parallel while in process. Two inches of clearance below the level of the plates provides for drilling through. V-grooves in the jaws provide for accurate clamping of round work.

The vise is made in three models. Model No. 1 is built as follows: opening of jaws, 3 in.; depth of jaws, ¾ in.; width of jaws, 2½ in.; net weight, 10 lbs. No. 2: opening of jaws, 10 in.; depth of jaws, 2 in.; width of jaws, 6 in.; net weight, 20 lbs. No. 3: opening of jaws, 10 in.; depth of jaws, 3 in.; width of jaws, 8 in.; net weight, 34 pounds.



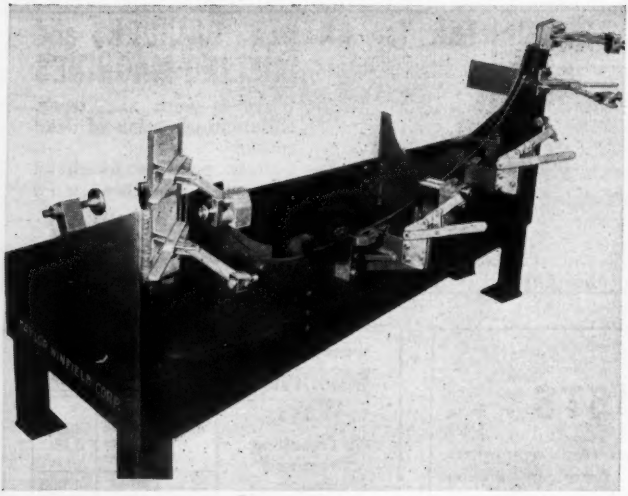
DeStaCo Toggle Clamp, with drawing illustrating principle of operation.

"DeStaCo" Toggle Clamp

To provide a means of holding sheet metal parts so that they can be welded or riveted without danger of slipping, the Detroit Stamping Company, 3449 West Fort St., Detroit, Michigan, has brought out the toggle clamp shown in the illustration. The design of the clamp is such that it prevents excessive buckling of the metal while processing, and is said to be slip-proof.

The clamp is made of steel stampings of sufficient weight to provide ample strength and rigidity, yet is light in weight and easy to operate. The design is such that the handle and the clamping bar travel in two distinct orbits, the orbit of the handle being about twice the diameter of the clamping bar orbit. The pivots, about which the toggle bar and handle revolve, operate in hard bronze bushings which eliminate looseness and provide for maximum length of life.

As can be seen by reference to the illustration, movement of the handle through 80 degrees results in the bar moving through a 160-degree arc. Prac-



DeStaCo toggle clamps in use for holding sheet metal sections to form for welding.

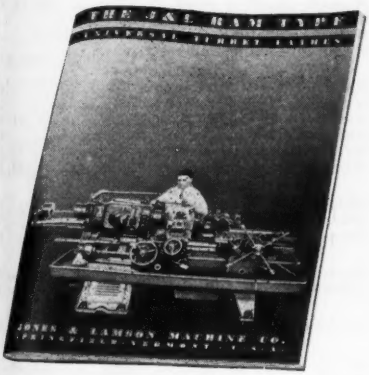
tically no effort is required for 70 per cent of the travel of the handle, because it is merely traveling to the work. The bar for this period travels approximately three times as fast as the handle. From this point on, the handle travels increasingly faster than the bar, and at the final 5 degrees of travel has a mechanical advantage of 12 to 1.

This design, with the links on the outside and the location of the pivot points as on the clamp shown, gives all the advantage of equal or greater pressure at the toggle bar, plus the very important advantage of the full clearance of the hold-down point from the work, when open, with only a short movement of the handle. The clamp will expedite operations with all kinds and sizes of fixtures, on all kinds of work.

Our Mistake — The Speeds Were Wrong

An error was made in the advertisement of the Delta Manufacturing Company, 3775 Holton St., Milwaukee, Wis., which appeared on page 21 of the November issue of this magazine. The speeds of the Delta "Slo-Speed" Drill Press were given as 390, 745, 1720, and 2051 r.p.m. These figures were in error; the speeds actually are 390, 745, 1280, and 2050 r.p.m.

J & L RAM TYPE TURRET LATHE. Mechanical engineers and executives who are directly concerned with production machinery of the most modern type will be interested in the information contained in this 32-page book. The text comprises a detailed description, with illustrations, of the newest product of



the Jones & Lamson Machine Co., Springfield, Vt., and presents the net result of 87 years of continuous experience in the building of turret lathes.

In addition to the description of the machine and its individual parts, the book shows and describes the complete range of attachments and accessories that may be used with the machine. Included among these are a variety of chucks, single and multiple roller back rest turners, stock support, centering tool holders and tool blocks, stock stop and center, turning heads, boring bars, indexing carriage turret and others.

The book is gratis to any engineer or executive.

Index to Advertisements

*ZONE INSERT.